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### Departments



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INDIA RUBBER WORLD

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# Evolution of Rubber Tensile Machines

**D. C. Scott**[1]

THE need of physical tests on materials was recognized as early as the seventeenth century, and through three centuries the application of materials testing machines was intimately associated with structural design, particularly of bridges and buildings. A summary[2] of historical data covers the early developments and indicates Galileo (1564-1642) as the first systematic investigator of the strength of materials. After making tests on tenacity[3] about 1638, he estimated that a rod of copper, if "4800 arms" in length and suspended from one end, would fall of its own weight. Before 1729, Pieter van Musschenbrock, professor at the University of Leyden, appeared as the first to use investigation methods of precision[4] covering tension, bending and compression in long columns, but on a small scale only. France and England seem to have shown nearly equal aggressiveness in the early development of materials testing machines. In France, Jean Rodolphe Perronet (1708-1794), the dean of French engineers, built about 1768 the first comparatively large universal testing machine of approximately 18 tons' capacity.[5] The elasticity of materials was determined for the first time[6] on a large scale by P. S. Girard (1765-1836) on a 100-ton testing machine constructed by Lamblardie (1747-1797).[7] One of the first, if not the very first testing machine to be built in America was used between 1832-1837 by the committee of the Franklin Institute of Pennsylvania on the Explosion of Boilers (at the request of the Treasury Department of the United States). Also at this time investigations as to the effect of temperature on the tensile strength of metals were carried out with surprising ingenuity.

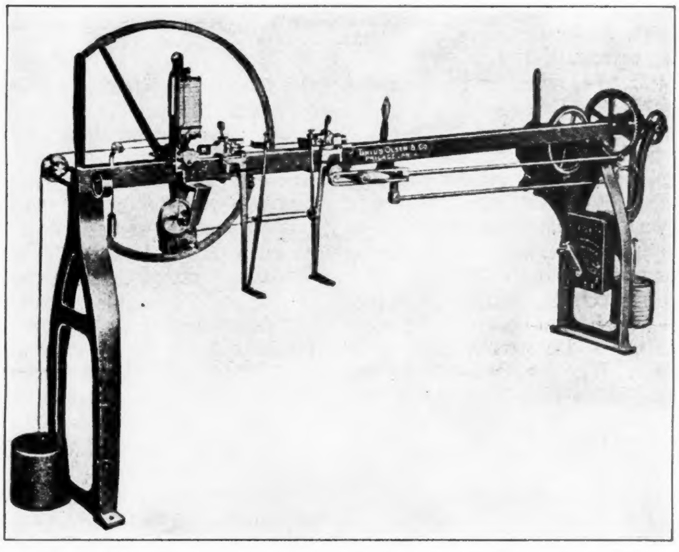

Fig. 1. Rubber Tensile Machine Designed by Tinius Olsen Co. for W. C. Geer, of B. F. Goodrich Co. (Described in 1910)

## Early Textile-Yarn Tensile-Testers

A catalog of mill supplies published in 1881 by Brown Brothers & Co., Providence, R. I., listed the American Yarn Tester, described as "The standard English machine for testing the strength and stretch of Cotton Yarn."

[1] President, Henry L. Scott Co., Providence, R. I.
[2] "Materials Testing Machines" by C. H. Gibbons, published in "Baldwin Locomotives," 13, 1, pp. 24-31 (1934).
[3] Fontenelle, "Historie de L'Academie Royale des Sciences," 1702, p. 121.
[4] Musschenbrock, "Introductio ad Cohaerentiam Corporum Firmorum," 1729; Peter Barlow, "The Strength of Materials," 1867, p. 3.
[5] W. C. Unwin, "Engineering," (London), Vol. 92, p. 643; Lesage, "Second Recueil de Memoires des Ponts et Chaussées," 1810, says in 1758.
[6] W. C. Unwin, "Engineering," (London), Vol. 92, p. 643, also "Proceedings Institution Mechanical Engineers," Oct. 1918; P. S. Girard, "Traité Analytique de la Resistance des Solides," 1798.
[7] First director, "Ecole Central de Travaux Publics," later "Ecole Polytechnique" (1795).

This book also reproduced an "English Table showing the quality of warp yarn by the weight that one-seventh of a hank or eighty turns of a yard and a half reel from one bobbin will bear before breaking, given in pounds and ounces." This tester was a vertical hand-powered machine with a pound-graduated dial at the top and a weighted pendulum. During the test this pendulum would swing along a quadrant equipped with a rack into which a pawl on the pendulum dropped at the point of break.

Goodbrand & Co., Manchester, England, published in 1910 a catalog which presented photographs and descriptions of hand and belt driven machines listed as "Deadweight Lever Yarn Testers." These vertical machines appear similar in principle and basic construction to those listed by Brown Brothers & Co. While it is not stated when this type of machine was originated, reports indicate that this English company, or its predecessor, was in 1853 building tensile machines for yarn testing which incorporated the principle of the dead-weight pendulum for measuring the pull.

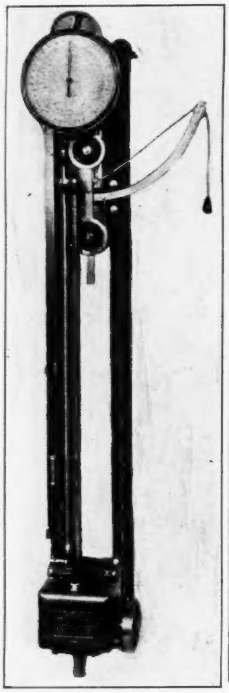

**Fig. 2. First Scott Tester for Rubber (1912)**

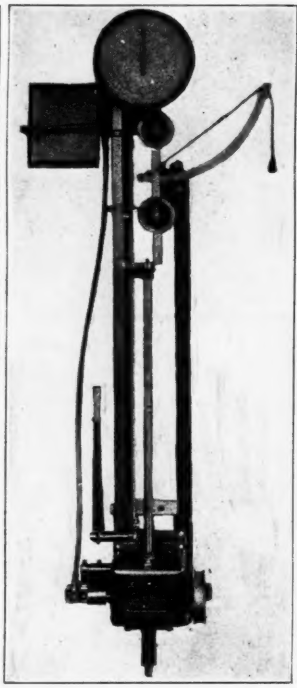

**Fig. 3. Scott Tester with Autographic Recorder (1913)**

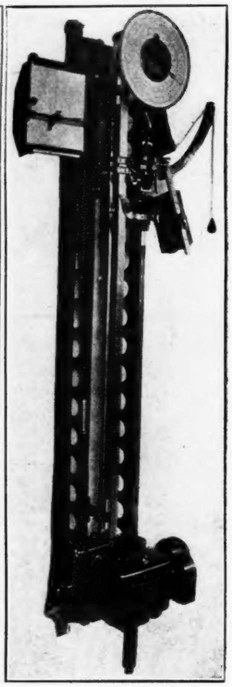

**Fig. 4. Combination Friction and Tensile Tester (1915)**

Previous to approximately 1910 a number of American companies had been producing tensile testing machines for building materials, paper, cloth, and yarn, but a search of available records fails to show general commercial availability of rubber testers. Riehle Bros. Testing Machine Co., Philadelphia, issued a catalog in October, 1912, which showed hand-powered vertical machines, obviously of the spring-scale type, with calibrated dials at the top, but without pendulum. It also described gravity-operated testers with no dials, but with graduated quadrants along which a weighted pendulum would swing to indicate the pull. Both types were for textile or paper testing. This catalog presented the "Riehle U. S. Standard Testing Machine for Rubber," a vertical hand-operated draw-bar machine with a dial at the top and a stretch scale at the side, but without a pendulum. The catalog listed the machine in use by the Bishop Rubber Co., New York.

## Pioneer Testing Machine for Rubber

At the meeting of the American Society for Testing Materials[8] held June 28 to July 2, 1910, Thorsten Y. Olsen, of the Tinius Olsen Co., Philadelphia, presented a description of an Autographic Rubber-Testing Machine, shown in Figure 1, which had been "designed at the request of Dr. W. C. Geer, then chief chemist of The B. F. Goodrich Co., in order to obtain more complete data and to determine various characteristics of rubber not obtainable on any present testing machine."

Regarding the status at that time (1910), Mr. Olsen said, "Rubber has in the past few years been subjected to tests by the United States Government and possibly by a few large users, such as railroads, etc., but it is now passing beyond this stage and the rubber manufacturers are devising more thorough tests to determine the quality of their product. At the meeting of the International Association for Testing Materials last year (1909), the question of rubber testing and machines for that purpose was considered, showing a universal tendency toward more complete methods for testing this material."

On this horizontal machine "The pendulum-balance method was selected as the most accurate automatic means of weighing the load. It was found essential that the load should always be on the specimen, inasmuch as an autographic record was desired of both the application and the removal of the load. This excluded any lever device." Mr. Olsen stated that the pendulum used was somewhat on the same principle as that in a pendulum machine he had described before the society two years before (1908), but he did not say whether or not the previous machine was for testing rubber. Probably it may well be assumed that rubber was not the subject of the earlier discussion.

The straining mechanism consisted of a disconnectable head attached to a horizontal screw draw-bar which was operated through gears by a variable speed motor. The apparatus was so designed that by disconnecting the head from the screw, tests could be made with the specimen under free load or under reciprocating pulls. An autographic recording device was incorporated to function in connection with tension tests, time tests under free-load, and repeated-load tests. Two clamps applied to the specimen at the bench marks operated respective finger-levers (shown below the frame in Figure 1) which were so related to each other and connected to the recording pencil that only the elongations between the clamps were noted on the diagram.

The specimen for which the machine was designed consisted of a strip of rubber about ⅛-inch thick, one inch wide, and six inches long and reduced between the ends to a width of ½-inch for a straight length of two inches, on which portion the stretch was measured. The entire length of the machine was nine feet. According to available records of published descriptions, this is the first machine built for the physical testing of vulcanized rubber.

[8] "Proceedings of the Thirteenth Annual Meeting, ASTM," Vol. 10, pp. 588-91.

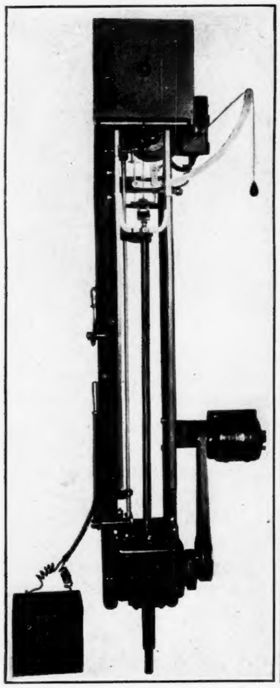

Fig. 6. Tensile Tester with Electric Spark Recorder (1924)

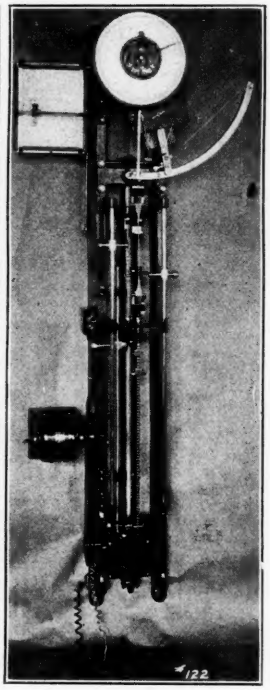

Fig. 7. Present Scott Machine Embodying Previous Developments (1927)

## Accelerated Adoption of Rubber Testers

About the same time that the Tinius Olsen Co. built a vertical "Navy type" rubber tensile tester for the U. S. Government (1911), the Cooey Machine Co., Kitchener, Canada, designed and developed a testing machine at the request of a local rubber company, but the Cooey tester disappeared from the market at the beginning of the World War as the Cooey Machine Co. transferred its activities to producing war materials.

As an indication of the recognized importance of testing rubber at this time, in December, 1911, the Executive Committee of the A.S.T.M. appointed Committee D-11 on Standard Specifications for Rubber Products. The first organization meeting in February, 1912, was followed by another meeting in March, 1912.[9]

The Henry L. Scott Co., which had been building textile and other testing machines since 1899, had patented[10] a gearing mechanism for motor drive on testing machines and also the application of the weighted pendulum, dial indicator, and screw mechanism for separating the clamps.[11] At the textile show at Boston in October, 1912, the Scott company exhibited one of its vertical textile testers which embodied the features of these recent patents. The draw-bar traveled at the rate of twelve inches per minute for a distance of eight inches.

Upon observing this machine, Dr. A. A. Somerville asked Scott to build for rubber testing at the United States Rubber Co.'s General Laboratories in New York, a modified machine, as shown in Figure 2, on which the draw-bar should travel at 20 inches per minute for a distance of 48 inches so as to provide for the increase in elasticity of rubber over textile yarns. After this first machine for rubber was delivered to the United States Rubber Co. in December, 1912, a second unit was ordered, and delivery was made during the second quarter of 1913. With two machines operating it became evident that some minor alterations were needed, particularly relating to the clamps to hold the specimens which were die-cut of dumbbell shape ⅛-inch thick and ¼-inch wide for somewhat more than the testing length of one inch or two inches. Provisions were then made on a third machine, shown in Figure 3, to add a flat rectangular autograph recording device[12] to show the tensile in pounds pull in relation to the elongation, and delivery was made to New York during the Summer of 1913.

In 1914 Scott delivered to the General Laboratories of the United States Rubber Co. a duplicate of the third machine, and Somerville then transferred the third and fourth machines to the company's plantations in Sumatra. Successive installations were made rapidly in other factories until the United States Rubber Co. had taken delivery of approximately 45 machines, some of which were combination rubber and fabric testers. The first combination rubber and tire fabric tester, as shown in Figure 4, was developed for the Braender Rubber Co., Rutherford, N. J., about 1915. An auxiliary gear box providing a draw-bar speed of two inches per minute could be engaged for friction testing.

Also in 1915 the Scott company designed and built its first horizontal rubber tester in collaboration with William Beach Pratt, who conducted a technical rubber laboratory in Boston. This machine, shown in Figure 5, embodied the principles of the preceeding vertical testers, but did not become popular. Then followed a period of expansion with Goodrich, Goodyear, General, and other rubber companies showing interest in the new machines so that up to the time of the post-war depression in 1920 to 1921 the Henry L. Scott Co. had delivered a total of 320 machines.

## Improvement of Construction

As the result of the extensive use of numerous machines, there was an evident need of refinements in construction which would overcome certain objections and enlarge the scope of the testers as indicators of the suitability of rubber products for specific needs.

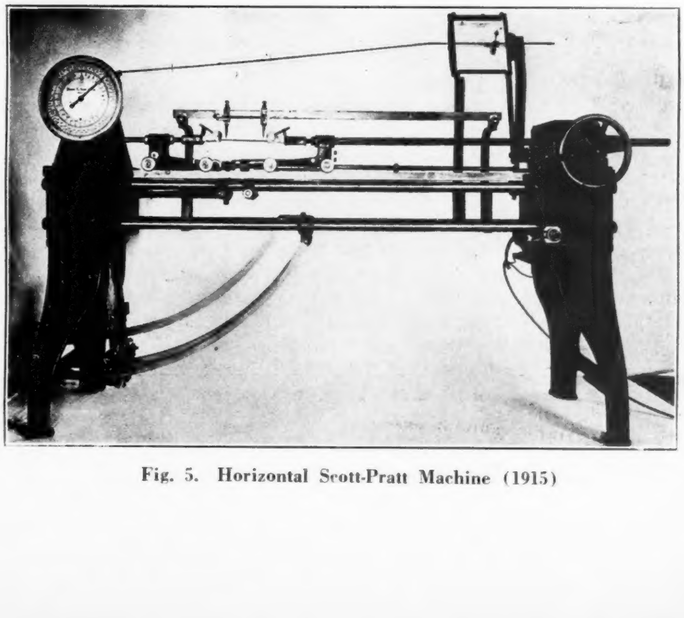

Fig. 5. Horizontal Scott-Pratt Machine (1915)

[9] India Rubber World, Apr. 1, 1913.
[10] U. S. patent No. 924,693, issued June 15, 1909, on application dated Feb. 13, 1909.
[11] U. S. patent No. 940,482, issued Nov. 16, 1909, on application dated Mar. 10, 1909.
[12] U. S. patent No. 1,324,470, issued Dec. 9, 1919, on application dated Apr. 3, 1917.

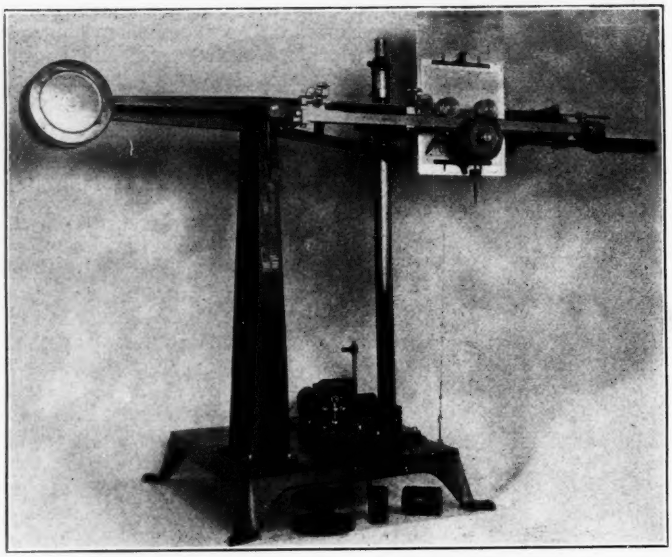

Fig. 8. Incline Plane Rubber Testing Machine

### Quick Return Device

To increase the effectiveness of the machine by decreasing the waiting time while the lower head was being returned to the starting position, Scott incorporated in the machine in 1924 a double counter-balanced rack drive[13] so that the head traveled very quickly in reverse by gravity.

### Electric Spark Recording

Around 1922, D. F. Cranor, then with Lee Tire & Rubber Co., worked out on its machine a method of recording the stress-strain data points on a paper dial by means of an electric spark. In 1924 Scott adopted to his machine, as shown in Figure 6, this principle with which he at first used the loose-weight[14] method of adjusting the machine to compensate for variation in thickness or gage of the sample and to give results direct in terms of tensile per square inch. He later changed to a sliding weight[15] on the machine lever for simplicity and convenience of operation.

### Compensation for Gage

A successful attempt to compensate a testing machine for gage of sample was made by Dr. Charles A. Soch at the Hood Rubber Co. about 1924 when he developed an attachment which was added to the especially designed Hood machines. These machines used a peculiar dumbbell shaped test piece and were generally in the classification of special apparatus. Prior to 1926 Scott had marketed a method to compensate for gage which was incorporated in some of his machines. About the same time Carl S. Williams developed at the R. & H. Chemical Co. a means of compensating for gage[16] by sliding auxiliary weights over a graduated extension on the machine weight lever. He also developed a manually operated means for autographically recording stress-strain data.[16]

### Chain Drive Replaces Solid Rack Form of Draw Bar

Because of the frequent installation difficulties resulting from the need of vertical space below the gear box to allow for draw bar travel, the Scott company developed late in 1926 the continuous chain drive[17] for the pulling head. The chain, which passed through a vertical hollow tube, carried a weight in two sections and leather washers so located as to cushion the shock of the blow caused by the rapid return of the pulling jaw to the starting position after the test. Since this return is by gravity, when the drive to the chain is released, this blow assumed sizable proportions, and this design of air cushioning was developed and patented at that time.

## Consolidation of Improvements

While each of the new developments had been used on various machines during the period of origination from 1917 to 1927, the Henry L. Scott Co. first adopted into its standard machine, as indicated in Figure 7, a unified assembly of the previous improvements. In 1927 the first machine embodying all these features was shipped to the U. S. Bureau of Standards, Washington, D. C., and the second to the commercial laboratory of Dr. W. C. Geer, at Mt. Vernon, N. Y. These machines were equipped with the compensation-for-gage feature, chain drive, quick head return by gravity, autographic recording of stress-strain diagram, and the modern electric spark method of obtaining data points for the graph, which device was operated by a switch controlled either by hand or foot. This type of tensile tester has remained standard and is the generally accepted machine at the present time.

## Albertoni Horizontal Tester

In 1926, George Albertoni designed and built at the Goodyear Tire & Rubber Co., Akron, a horizontal machine which included compensation-for-gage by a sliding weight and a principle of measuring elongation similar to Olsen's method. He employed two carriages beneath the specimen with spring points in contact with the specimen at the bench marks. He recorded the elongation on a flat plate recorder.

## Accepted Pulling Speed

Before the advent of special machines for rubber testing, the traveling speed of the pulling head on textile machines had been 12 inches per minute. Because of the great demand for testing rubber and the less frequent need of testing fabric in practically all rubber factories it became more or less general practice to test textiles on the rubber machines at the same speed of 20 inches per minute as was recognized to be necessary for rubber. In June, 1914, the A.S.T.M. Committee D-13 for Textiles, consisting of 17 representative members with Chairman W. C. Hartshorne, of Pacific Mills, took up the question of textile testing speed and again standardized on 12 inches per minute for textiles, while the speed for rubber remained at 20 inches per minute.

## Constant Specimen Rate of Load

The most recent development in testing principles is the application of the incline plane method, which applies to the specimen itself a definite amount of load per unit of time regardless of whether the test sample is long

(*Continued on page* 48)

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[13] U. S. patent No. 1,678,369, issued July 24, 1928, on application dated October 22, 1926.
[14] U. S. patent No. 1,656,246, issued Jan. 17, 1928, on application dated Aug. 9, 1926.
[15] U. S. patent No. 1,679,751, issued Aug. 7, 1928, on application dated Mar. 31, 1927.
[16] U. S. patent No. 1,627,366, issued May 3, 1927, and assigned to Henry L. Scott Co., May 16, 1929.
[17] U. S. patent No. 1,659,675, issued Feb. 21, 1928, on application dated Feb. 8, 1927.

# Sponge or Expanded Rubber

Joseph Rossman

THE abstracts given below continue the informative article on cellular rubber that was begun in our January issue.

22. Untiedt, 1,845,688, Feb. 16, 1932. The process of providing textile fabrics with a layer of sponge rubber includes applying to the fabric a layer of a dense, relatively stable aqueous foam containing a rubber latex, drying the foam whereby a porous rubber layer is formed, compressing the dried layer to decrease its porosity to the desired extent, and vulcanizing the rubber.

23. Chapman, 1,852,447, Apr. 5, 1932. A method of forming cellular structures of rubber comprises incorporating ammonium oleate and potassium silicofluoride into a dispersion of rubber, forming such dispersion into a froth, and setting the froth to an irreversible gel.

Example 1. A latex mixing is prepared as follows:

| | Parts by Weight |
|---|---|
| Rubber | 63 |
| Sulphur | 2 |
| Zinc diethyldithiocarbamate | 0.3 |
| Mineral oil | 9 |
| Zinc oxide | 1 |
| Whiting | 19.2 |
| Lamp black | 5.5 |
| Caustic potash | 0.4 |
| Casein | 0.1 |
| Oleic acid | 0.2 |

in the form of a latex cream sufficiently viscous and concentrated to prevent the segregation of the compounding ingredients. One half part by weight of sodium silicofluoride on the dry mix is added, and the mass is whipped a few minutes. It is then placed into molds, for example, ball molds with vents to allow free expansion of the material, and heated for two to three hours at 95° C. The resulting product, when dry, is a cellular rubber suitable for manufacturing sponge balls, mats, etc.

24. Ziegner, 1,856,684, May 3, 1932. The process of manufacturing porous bodies consists in imbuing porous particles with gasoline, intermingling the porous particles with rubber, and causing contraction of the rubber surrounding the particles by vaporization.

25. Wiig, 1,856,938, May 3, 1932. The process of leavening comprises incorporating into a mass to be leavened a ketone dicarboxylic acid which decomposes with heat and heating the mass to decompose the agent.

26. Hood, 1,857,085, May 3, 1932. Sponge rubber articles of non-uniform cross-section are molded by covering more than one half the mold surface with a sheet of sponge rubber compound, but leaving a portion of the mold surface uncovered, and proportioning the amount of surface covered at any cross-section of the mold to the area of such cross-section.

27. Ramsay, 1,862,633, June 14, 1932. The method of producing a cured rubber sheet having a multiplicity of minute and definite apertures includes bonding stretch-resisting material to one surface of a sheet of cured elastic rubber and then punching in the sheet, while held against stretching by the stretch-resisting material, a multiplicity of holes simultaneously by means of a perforating press with a multiplicity of simultaneously operating punching prongs.

28. Wilderman, 1,862,645, June 14, 1932. The process of manufacturing porous ebonite bodies comprises introducing partially vulcanized particles between foils while maintaining the particles at a temperature between 60 and 100° C., whereby the particles remain in a state of fine sub-division during introduction thereof between the foils, compressing the particles while between the foils to form porous bodies, and heating the compressed body to complete the vulcanization.

29. Flower, 1,871,974, Aug. 16, 1932. The method of shaping to uniform thickness and forming a relatively dense skin upon a vulcanized irregular slab of hard cellular rubber comprises compressing the slab between heated platens to the desired thickness to condense only the surface portions of the cellular slab and then cooling the platens while in compressed position to cool and harden the condensed skin on the slab.

30. Moran, 1,877,527, Sept. 13, 1932. To increase the surface skin upon sponge rubber articles cure sponge rubber stock in direct contact with a heated metal plate having a plurality of series of parallel grooves arranged in intersecting relation.

31. Moran, 1,884,106, Oct. 25, 1932. The process for producing gassed sheet rubber with a shaggy or hirsute texture consists of mixing gassed rubber stock with commercial hair, the formation of sheets, subjecting to sufficient heat to secure curing and splitting the sheets while they are still warm, whereby the hairs intersecting the split are drawn from the side in which they are least embedded.

32. Denton, 1,905,269, Apr. 25, 1933. The process of producing expanded rubber material consists in rolling up a strip of dough, binding it to prevent unrolling, effecting partial vulcanization of the roll by heat, simultaneously subjecting the roll to gas under pressure, cooling the roll and releasing the pressure, removing the binding to permit expansion of the dough, and finally effecting complete vulcanization by heat which simultaneously further expands the dough.

33. Girg, 1,908,747, May 16, 1933. A method of manufacturing white and blue colored marbled and streaky sponge rubber of uniform porosity consists in first preparing a primary rubber mass comprising the mixing of the following ingredients by weight, 50 parts raw rubber, 6 parts castor oil, 2 parts sulphur, 15 parts chalk, and 10 parts zinc white, then dividing the mass into equal portions and adding to one portion 17 parts lithopone to form the white element, and to the other portion to form the colored element, 16 parts heavy spar and one part of coloring matter, subsequently adding swelling agents to each of the elements, then drawing out each of the elements separately to form thin sheets, alternating the sheet elements and twisting the resultant mass, then rolling the twisted mass to form a plate, and finally vulcanizing the plate.

34. Beckmann, 1,909,746, May 16, 1933. Wood, metal, brick, and the like are surfaced with a thin veneer of microporous rubber. The veneer is in the form of a

cured colloidal rubber net of reticulate structure having microscopically visible, filter-size pores.

35. Olin, 1,912,591, June 6, 1933. The process of manufacturing vulcanized rubber articles comprises adding triethanolamine as a plasticizer to a vulcanizable rubber compound, milling the compound, then aging it to increase the plasticization thereof, forming the compound into rubber articles, and vulcanizing them.

36. Beckman, 1,918,893, July 18, 1933. As material for filtering liquids, a highly porous body comprises a finely divided aggregate dispersed in a porous matrix in the form of a cured colloidal rubber net of reticulate structure having microscopically visible, filter-size pores; the aggregate constitutes the major portion by volume of the article and is sufficient in amount to impart its character to the article.

37. Raepsaet, 1,931,964, Oct. 24, 1933. A process of manufacturing cellular rubber bands having closed cells by the method of vulcanizing the crude blanks enclosed in molds which are not tight, at the interior of an autoclave filled with gas under high pressure, comprises winding the crude rubber strip between two strips of paper and a strip of metal, winding several additional turns of the metal strip and the paper strips after winding the rubber band, winding several additional turns of the two paper strips after winding the metal strip, then cementing the additional turns of the paper strips, enclosing the roll thus formed in a receptacle of strongly connected metallic members, and while restraining the roll from expanding, introducing the whole into the autoclave.

38. Raepsaet, 1,941,053, Dec. 26, 1933. The process of manufacturing cellular rubber balls and other articles having closed cells containing gas under pressure consists in drilling passages through the body of the crude blanks by means of needles, placing the blanks in molds, introducing the molds in an autoclave filled with gas under high pressure, heating the blanks in the molds and thus partially vulcanizing them, taking the blanks out of the molds, grinding them until their surface is smooth, placing the blanks in a second series of molds, and again heating them until vulcanization is complete.

39. Siegfried, 1,941,420, Dec. 26, 1933. A process for expanding and sponging rubber products by preparing a plastic mixture comprises feeding the mixture to a vulcanizer, expanding the mixture to a cellular character, and creating a vacuum in the vulcanizer concomitantly with vulcanizing.

40. Madge, 1,945,055, Jan. 30, 1934. The method comprises forming a froth from an aqueous dispersion of rubber and vulcanizing materials in the proportions to form hard rubber, partially vulcanizing the froth, cementing a continuous exterior layer to the faces of the froth, and completing the vulcanizing of the structure.

41. Raepsaet, 1,948,046, Feb. 20, 1934. A process for manufacturing articles of cellular rubber and ebonite with closed cells comprises incomplete vulcanization in an autoclave charged with a gas under high pressure, of the rough casting of crude rubber mixture contained in a mold, removing the mixture from the autoclave and taking it out of the mold, whereupon it expands, heating in such a way as to produce a supplementary vulcanization and to bring the pressure in the interior of the cells to such a level that on being brought back to ordinary temperature it will be equal to the pressure of the atmosphere.

42. Netzel, 1,949,175, Feb. 27, 1934. A machine for curing sponge rubber strips comprises a supporting framework, a rectangular box-like housing positioned thereon, a similar housing adjustably supported above the housing, a metal plate on each housing positioned adjacent each other, a heating coil in each housing supported contacting the plates except for a short distance at each end, and a pair of spaced non-insulated conveyer belts positioned between the plates and adapted to convey uncured rubber therebetween.

43. Lindemann, 1,951,618, Mar. 20, 1934. The method of making rubber sponge consists in vulcanizing a rubber mix containing gas-producing raising ingredients in two stages, first by heating it in a chamber containing a mixture of gas introduced at substantial pressure and steam introduced at approximately the proper vulcanizing temperature thereby providing in the chamber the proper vulcanizing temperature and a pressure sufficient substantially to prevent expansion of the mix under the influence of the gas-producing ingredients, and, then, after partial vulcanization, reducing the pressure to permit expansion of the mix under the influence of the ingredients while maintaining the proper vulcanizing temperature by the introduction of steam, until vulcanization of the rubber sponge is complete.

44. Gorham, 1,952,163, Mar. 27, 1934. A method to produce upholstery comprises shaping a mass of aqueous rubber dispersion, partially embedding a fibrous material in the shaped mass, coating the exposed fibers of the material with rubber latex, and curing the resulting structure.

45. Bedford, 1,952,528, Mar. 27, 1934. A method of making a molded article having an imperforate air and moisture impervious hard rubber casing and a cork spongy porous core having vacuum spaces therewithin comprises completely surrounding a cork core in a mold with a plastic hard rubber composition, applying pressure sufficient to compress the cork core and to remove the air therefrom, heating the rubber casing sufficiently to render it fluid, and at the same time permitting the cork to expand, whereby a vacuum occupies the spaces previously occupied by air, then curing the rubber casing, and allowing it to harden about the expanded core.

46. Madge, 1,956,156, Apr. 24, 1934. A method of forming porous articles from rubber dispersions comprises gelling a concentrated dispersion of rubber composition in a mold, heating the molded composition to a vulcanizing temperature for a time insufficient for complete vulcanization to hard rubber while preventing escape of water therefrom, chilling the heated composition to room temperature, and again heating the molded composition to vulcanizing temperature.

47. Greenup, 1,959,160, May 15, 1934. The method of making microporous rubber comprises treating rubber latex with vulcanizing agents and a coagulant comprising ethylene diamine and a reagent selected from the group consisting of diphenylguanidine, ditolylguanidine, diorthotolylguanidine and triphenylguanidine, and then vulcanizing the mixture while wet.

48. Minor, 1,964,739, July 3, 1934. The process of manufacturing sponge rubber comprises subjecting a mass of rubber containing an accelerator which will cause the stock to set up quickly and at low temperature, to a surrounding atmosphere of carbon-dioxide gas at cylinder pressures (850 pounds) or below and for a period sufficient to secure absorption of the gas by the stock, releasing the pressure at a predetermined rate sufficient to secure uniform expansion of the gas cells within the rubber, and vulcanizing the rubber.

49. Minor, 1,964,740, July 3, 1934. The process of manufacturing a rigid cellular heat insulating material comprises subjecting a mass of rubber compounded for

*(Continued on page* 51)

# Rubber Traction Makes Amphibian Boat Possible

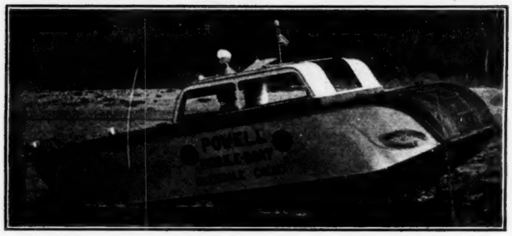


**Fig. 1. Mobile-Boat Leaving Water**

DESIGNED to travel on both land and water, the Powell Mobile-Boat is propelled by means of rubber tired wheels running on caterpillar tracks, to which are attached flexible rubber paddles. Intended primarily for use where there is no suitable harbor or where it is desirable to enter or leave the water at a distant point, the boat can be operated at a speed of 35 miles per hour on land and better than eight miles per hour in water. The unique construction of this new craft is covered by patents issued to the inventor, G. E. Powell.

The boat illustrated in Figure 1 weighs 4,300 pounds and is 19 feet long with an eight-foot beam. With a hull depth of four feet, the boat has an unladen draught of 19 inches and a draught of 23 inches when loaded with 1,000 pounds. This boat has ample provisions for seating eight persons and contains sleeping bunks for two.

## Rubber Paddle Design

The rubber paddles on this boat were cut from discarded automobile tires and folded into the proper shape. When they are bolted in position to the steel fabricated tracks, they provide a durable cushion tread for use on land and a means of propulsion in water. Figure 2 illustrates the formation of the rubber paddles and the method of attaching them to the track. In a test four paddles attached to a stiff board sustained a weight of more than one ton with a deflection of only ¾-inch. In Figure 2 it will be noted that the tractive edge is hollow, permitting the paddle to flex slightly under vertical load. The paddle also flexes somewhat under tractive power and when braking or steering on hard ground. While old automobile tires are being used for making paddles at the present time, the manufacturer intends to adopt a partially cured belting stock or something similar for future models. The paddles would then be molded and cured on to the fasteners for attaching to the track. Emergency repair paddles can be made from discarded tires as has heretofore been the practice in new installations.

## Traction Members

The steel tracks are driven by six pneumatic tires (21 by 5.25) on drop center wheels, three for each track. Figure 3 is a cross-sectional view of the tire, track, and paddles on one side of the boat. Solid tires, similar to the old carriage type, will be used on future models. The carrying capacity will be amplified as necessary by using multiple-tired wheels.

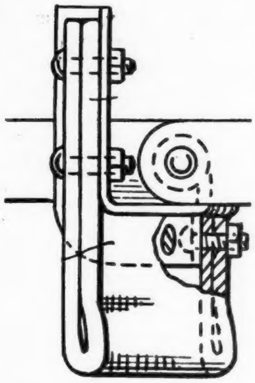


**Fig. 2. Rubber Paddle Construction**

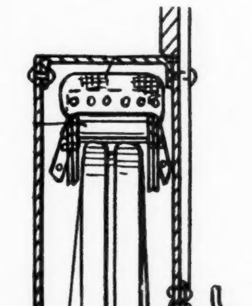


**Fig. 3. Tire and Caterpillar Track**

## Boat Operation

Power is supplied by a four cylinder Whippet engine which consumes about 1½ gallons of gasoline per hour. Steering on land or when entering or leaving the water is accomplished by releasing one or the other of two multiple disk clutches, one for each track and located in the rear axle transmission. When in deep water, two conventional-type rudders provide for steering, but this method can be supplemented by the clutch control of the paddles. The rudders are located at the slip stream of the paddles. In the water or on land the boat responds very quickly and can be turned in a short radius. The manufacturer does not limit the Mobile-Boat to the size shown here, but anticipates building crafts of this nature up to several hundred tons in weight.

## Utility

The utility of the Mobile-Boat permits it to come or go regardless of the height of the tide; it needs no harbor or anchorage; and because of its light draught it is particularly adapted for working close to shore. However the boat is extremely seaworthy; owing to its inverted bottom it resists any capsizing agencies. The mobility of this new type of craft also suggests its use for life-saving purposes as it can be stationed strategically on the beach ready for instant service, and it is adaptable to inter-island transportation of passengers and freight, thus rendering piers unnecessary. As an adjunct to a country's naval and military defenses, the Mobile-Boat could be carried on board ship and, when desired, could be lowered into the water to take men or equipment ashore. For offensive purposes suitable armor would be necessary to protect the craft.

# Statistical Background of Early American Rubber Industry—II

E. G. Holt

THE last decade of the period covered in the previous article, from 1845 to 1854, was that of rapid early growth for the rubber manufacturing industry. The period from 1855 to 1872 discussed here was one of vicissitudes, featured by loss of export markets, the disruption of trade (but its stimulation in some lines) during the Civil War, and the growth of imports of rubber manufactures; nevertheless the domestic industry continued to progress at a very satisfactory rate, taking the period as a whole. There is much to be gained from analysis of official statistics of foreign trade in rubber and rubber products during this period, for some definite information began to be regularly published in 1855, although, as in the previous article, a certain latitude of judgment must be allowed to any one seeking to interpret the available data in terms of rubber tonnage.

## United States Rubber Imports Reported by Value

Beginning 1855, the imports of unmanufactured rubber (probably also including gutta percha until 1858) were annually reported by value, and during the Civil War the quantity was also intermittently published, regularly so beginning 1868. The following tables show the officially reported sources in detail for these imports, from 1855 to 1868 inclusive, years ended June 30, by value. Brazil was, of course, the principal source, but New Grenada, the British and Dutch East Indies, England, and Holland were also important, and there were scattering imports from many other countries. Note that some imports from Africa were recorded in these earliest years for which details by countries are available, that in some years imports from the Dutch East Indies apparently reached us via Holland, and that New Grenada was succeeded by Colombia in 1867. "Revised" totals for years 1858 to 1868 inclusive cover imports of both rubber and gutta percha (the latter relatively unimportant), the data by countries for these years covering only india rubber. Beginning 1869, rubber and gutta percha were combined in a single class in the import schedule and were not again separately reported until 1890.

If the average price per pound of rubber and gutta percha were taken as 30¢ for years 1855 to 1859, the annual imports in long tons would be estimated: 1855—2,464 tons, 1856—1,554 tons, 1857—1,237 tons, 1858 (revised)—1,052 tons, and 1859 (revised)—1,462 tons. Remember that 1854 imports were estimated at 2,895 tons; it is evident that the years immediately thereafter were characterized by relatively low imports. The estimates are probably conservatively low, as 30¢ is believed to be slightly higher than the actual declared value of the imports at that

United States Imports of Rubber—Value in Dollars

| Countries | 1855 | 1856 | 1857 | 1858 | 1859 | 1860 | 1861 |
|---|---|---|---|---|---|---|---|
| England | 125,708 | 37,469 | 71,232 | 579 | 147,680 | 5,785 | 11.644 |
| Brazil | 1,155,871 | 771,326 | 505,789 | 491,782 | 675,566 | 1,192,313 | 683,106 |
| British North America | 96 | 761 | ...... | 4 | ...... | 3 | ...... |
| British Honduras | ...... | 123 | ...... | ...... | ...... | 175 | 2,735 |
| British West Indies | 9 | 1,174 | 392 | 44 | 26 | 697 | 324 |
| Cuba | ...... | ...... | ...... | 364 | ...... | ...... | ...... |
| Danish West Indies | ...... | 4 | ...... | ...... | ...... | ...... | ...... |
| Dutch West Indies | ...... | 6 | ...... | ...... | ...... | ...... | ...... |
| French West Indies | ...... | ...... | ...... | ...... | ...... | ...... | 300 |
| Hayti | ...... | 344 | ...... | ...... | ...... | ...... | ...... |
| Mexico | 3,961 | 777 | 10 | 143 | ...... | 107 | ...... |
| Central America | 491 | 239 | 483 | ...... | 61 | 455 | 4,095 |
| New Grenada | 141,831 | 70,274 | 62,981 | 42.210 | 28,343 | 114,573 | 268,393 |
| Venezuela | 12 | 11 | ...... | ...... | ...... | ...... | ...... |
| Peru | 1,719 | 47 | ...... | ...... | 1,297 | ...... | ...... |
| Chile | 46 | 10,045 | 266 | 4,428 | 17,825 | 74 | 897 |
| Buenos Ayres | ...... | ...... | ...... | ...... | 592 | ...... | ...... |
| British Africa | 1,015 | 3.753 | ...... | ...... | 3,506 | ...... | ...... |
| Other Africa | 8,879 | 5,873 | 2,814 | ...... | 358 | 593 | 2,693 |
| Dutch East Indies | 89,330 | 41,800 | 54,174 | 37,106 | 41,918 | 52,812 | 7,241 |
| British East Indies | 74,594 | 89,494 | 99,084 | 85,267 | 16,716 | 58,633 | 146,220 |
| Philippine Islands | ...... | ...... | 2,142 | ...... | ...... | ...... | ...... |
| Turkey in Asia | ...... | ...... | ...... | ...... | ...... | ...... | 3,739 |
| Bremen | 4 365 | ...... | ...... | ...... | 9,790 | ...... | ...... |
| Hamburg | 9,302 | 2,548 | ...... | ...... | 2,655 | ...... | ...... |
| Holland | 42,723 | 9,047 | 30,680 | 3,142 | 25,062 | ...... | ...... |
| Spain | 189 | ...... | ...... | ...... | ...... | ...... | ...... |
| France | ...... | 461 | 2,011 | 1,191 | 80 | 2 | 4 |
| Canada | ...... | ...... | ...... | 323 | 14 | 4 | 27 |
| Belgium | ...... | ...... | ...... | ...... | ...... | ...... | 78,842 |
| TOTAL | 1,660,141 | 1,045,576 | 832,058 | 666,583 | 971,489 | 1,426,226 | 1,210,372 |
| Revised totals | ...... | ...... | ...... | 708,231 | 983,944 | 1,427,142 | 1,245,373 |

Source: Commerce and Navigation of the United States, and Monthly Report, Bureau of Statistics, Nov., 1869.

UNITED STATES IMPORTS OF RUBBER—VALUE IN DOLLARS

| Countries | 1862 | 1863 | 1864 | 1865 | 1866 | 1867 | 1868 |
|---|---|---|---|---|---|---|---|
| England | 58,178 | 335,405 | 142,323 | 250,924 | 101,749 | 99,263 | 17,032 |
| Brazil | 411,364 | 831,876 | 1,098,176 | 649,280 | 935,689 | 1,661,806 | 1,505,300 |
| British North America | ...... | ...... | ...... | 286 | ...... | ...... | 37 |
| British Honduras | ...... | ...... | ...... | 400 | 6,637 | 26,946 | 14,560 |
| British West Indies | 133 | 248 | 316 | 280 | 9,108 | 2,539 | 1,239 |
| Cuba | 230 | ...... | 519 | 252 | ...... | 1,281 | 6,880 |
| Danish West Indies | ...... | ...... | ...... | 27 | 36,345 | 3 | ...... |
| Dutch West Indies | ...... | ...... | ...... | ...... | ...... | 480 | ...... |
| Hayti | ...... | 4,753 | ...... | ...... | ...... | ...... | ...... |
| Mexico | 252 | ...... | 201 | 20 | 214 | 228 | 600 |
| Central America | 1,754 | ...... | 9,945 | 16,300 | 25,450 | ...... | ...... |
| Guatemala | ...... | ...... | ...... | ...... | ...... | 976 | 3,173 |
| Honduras | ...... | ...... | ...... | ...... | ...... | ...... | 979 |
| New Grenada | 90,737 | 221,061 | 263,996 | 146,953 | 210,861 | ...... | ...... |
| Nicaragua | ...... | ...... | ...... | ...... | ...... | 44,224 | 26,692 |
| Colombia | ...... | ...... | ...... | ...... | ...... | 381,211 | 456,341 |
| Venezuela | ...... | ...... | ...... | 1,698 | ...... | ...... | ...... |
| British Africa | ...... | ...... | 2,414 | ...... | ...... | ...... | ...... |
| Other Africa | ...... | ...... | ...... | ...... | ...... | ...... | 216 |
| Dutch East Indies | ...... | ...... | ...... | 8,794 | 2,783 | 8,929 | 34,222 |
| British East Indies | 38,914 | 35,088 | 93,906 | 57,251 | 28,434 | 114,247 | 111,140 |
| China and Japan | ...... | 8,747 | ...... | ...... | 10,275 | ...... | ...... |
| Bremen | ...... | ...... | ...... | 4,232 | 907 | ...... | ...... |
| Hamburg | ...... | 83 | 6,755 | ...... | ...... | ...... | ...... |
| Holland | 14,810 | 18,744 | 12,980 | ...... | ...... | ...... | ...... |
| Spain | ...... | 12,874 | 25,390 | 20,731 | 54,026 | 28,624 | 1,606 |
| France | ...... | ...... | 401 | 3,465 | 20 | ...... | ...... |
| Canada | ...... | 83 | 34 | 2 | 41 | 37 | ...... |
| Portugal | ...... | ...... | ...... | ...... | 20,720 | ...... | ...... |
| Italy | ...... | ...... | ...... | ...... | ...... | 488 | 319 |
| TOTAL | 616,372 | 1,468,962 | 1,657,356 | 1,160,895 | 1,443,259 | 2,371,282 | 2,180,336 |
| Revised | 728,230 | 1,476,140 | 1,702,741 | 1,223,055 | 1,459,586 | 2,388,288 | 2,192,691 |

Source: Commerce and Navigation of the United States, and Monthly Report, Bureau of Statistics, Nov., 1869.

time. It will be noted that import value estimates used in this and the preceding article have been progressively higher. The history of rubber prices throughout the period during which the commodity was obtained from trees growing wild in the jungle was one of constantly rising prices, but up to this time there had been no attempt to manipulate the market, as first occurred in the early eighties of the last century. Strange to say, imports into the United Kingdom and France declined likewise after 1854-1855 for a few years, and such evidence as is available indicates this decline represented a falling off in demand, coinciding, however, with a period when Brazilian exports were low, though whether their war with Paraguay at the time had an influence on their exports is uncertain.

## Annual Weight of Imports Reported in Part—1860-1872

The official statistics in themselves afford no proper basis for estimating the price per pound of imports until the time of the Civil War, in which period some imports were subjected to import duty, while others were free. The weight of the duty-free imports of unmanufactured india rubber was reported for the year ending June 30, 1861, and the average value per pound was 29.7¢, which may therefore be used for estimating the quantity of that year's dutiable imports, officially reported by value only. Statistics for weight as well as value were reported for both free and dutiable imports in the two succeeding years, but thereafter only value statistics were reported until 1868, after which the quantity was regularly stated. The table indicates that crude rubber imports continued to be dutiable (with some exceptions in 1861 and 1862) until 1871, when the commodity was placed on the free list; since then such imports have always been duty-free. Presumably, rising prices and concern over supplies, plus a desire to aid manufacturers to compete in foreign trade with their finished products, were influences in causing this change. The table shows statistics as reported in annual trade returns for the respective years, not the revised totals published in 1869, and the effect of the Civil War on the trade in 1861-1865 is clearly evident, as well as the very great subsequent increase in imports.

The average declared value per pound was therefore about 29.7¢ in 1861, 29¢ in 1862, 28.7¢ in 1863, and 25.9¢ in 1868. After consulting the import statistics for the United Kingdom, and in view of the above, the writer is inclined to estimate the value per pound of rubber imports for years in which weights were not reported as follows: 1860—30¢, 1864—27¢, 1865—31¢, 1866—34¢, and 1867—32¢. These values were used in estimating the weight of imports shown in the table below.

For 1869 the declared value per pound of United States rubber imports was 32.1¢, but thereafter, as demand increased sharply, the unit value rose to 35.9¢ for 1870, 39.7¢ for 1871, and 40.5¢ for 1872. These values derived from the preceding table, presumably are considerably lower than the prices paid by manufacturers, but are certainly indicative of price trends during the sixties and

ESTIMATED QUANTITY OF UNITED STATES ANNUAL RUBBER IMPORTS—1860 - 1872

| Year Ended June 30 | Free | | Dutiable | | Total | |
|---|---|---|---|---|---|---|
| | Pounds | Value | Pounds | Value | Pounds | Value |
| 1860 | ........ | ........ | (part) | $1,424,777 | E4,750,000 | $1,424,777 |
| 1861 | 691,697 | $205,878 | E3,470,000 | 1,004,382 | E4,161,697 | 1,210,260 |
| 1862 | 697,522 | 219,532 | 1,428,039 | 396,840 | 2,125,561 | 616,372 |
| 1863 | ........ | ........ | 5,104,650 | 1,468,962 | 5,104,650 | 1,468,962 |
| 1864 | ........ | ........ | E @ 27¢ | 1,657,356 | E6,115,000 | 1,657,356 |
| 1865 | ........ | ........ | E @ 31¢ | 1,160,895 | E3,745,000 | 1,160,895 |
| 1866 | ........ | ........ | E @ 34¢ | 1,443,259 | E4,245,000 | 1,443,259 |
| 1867 | ........ | ........ | E @ 32¢ | 2,371,282 | E7,410,000 | 2,371,282 |
| 1868 | ........ | ........ | 8,438,019 | 2,180,336 | 8,438,019 | 2,180,336 |
| 1869 | ........ | ........ | 7,813,134 | 2,505,632 | 7,813,134 | 2,505,632 |
| 1870 | ........ | ........ | 9,624,098 | 3,459,665 | 9,624,098 | 3,459,665 |
| 1871 | 6,155,331 | 2,307,233 | 4,876,608 | 2,083,543 | 11,031,939 | 4,390,776 |
| 1872 | 11,803,437 | 4,789,590 | ........ | ........ | 11,803,437 | 4,789,590 |

E—Estimated.

QUANTITY OF UNITED STATES RUBBER IMPORTS BY SOURCES
Quantity in Pounds

| | 1862 | 1863 | 1868 | 1869 | 1870 | 1871 | 1872 |
|---|---|---|---|---|---|---|---|
| TOTAL | 2,125,561 | 5,104,650 | 8,438,019 | 7,813,134 | 9,624,098 | 11,031,939 | 11,803,437 |
| Brazil | 1,204,613 | 2,944,518 | 5,550,860 | 4,490,980 | 5,234,294 | 5,792,195 | 4,766,387 |
| Colombia | 540,585 | 923,330 | 2,103,274 | 2,336,962 | 2,593,918 | 3,523,714 | 5,363,625 |
| United Kingdom | 173,519 | 932,228 | 64,622 | 339,177 | 530,864 | 855,891 | 647,955 |
| British East Indies | 139,521 | 172,111 | * | 224,767 | 416,345 | 192,166 | 215,426 |
| Netherland East | 54,434 | * | 107,210 | 28,940 | 9,040 | 14,163 | 119,402 |
| Straits Settlements | ........ | * | * | 82,190 | 153,467 | 218,612 | 113,253 |
| Central America | 11,303 | 16,156 | 163,836 | 128,730 | 287,397 | 198,901 | 188,222 |
| Mexico | 1,586 | * | * | 34,842 | 98,656 | 93,046 | 106,417 |
| All Other | ........ | 116,307 | 448,217 | 146,546 | 300,117 | 143,251 | 282,750 |

*Included under "all other."

early seventies. In 1872 the United States for the first time imported more rubber from Colombia than from Brazil (in 1869 and 1870 imports from Colombia were only one-half as great as from Brazil); this very rapid exploitation of caucho rubber was characteristic of later rubber history in other parts of Latin America. The race for rubber supplies was on; the increasing need of the commodity was beginning to turn men's minds to the possibilities of rubber plantations; the stage was set for the events leading up to the smuggling of Hevea seeds from Brazil in the late seventies.

The above table summarizes available official statistics through 1872 (years ended June 30) on the weight of rubber imports by countries, definitely reported only for the years shown; imports of gutta percha are included in the data for years 1869 to 1872, but not for the earlier years.

Even at this early time the United Kingdom was already the most important secondary trading market for crude rubber. Exploitation of Hevea rubber in Brazil, caucho rubber in Colombia, Central America, and Mexico, and Ficus and vine rubber in the East Indies, was well under way. Rubber from Brazil fetched top prices; the average declared value of such United States imports increasing from 30¢ per pound in 1862 and 1863 to 36.6¢ after the war, 1868 to 1870 inclusive. In the latter period the caucho rubber imports were declared at between 23¢ and 25¢ per pound, and the imports from the East Indies and United Kingdom between 28¢ and 32¢, which gives some idea of the variation in price of different kinds of wild rubber at that time. In the three years ended June 30, 1870, over 95% of the rubber imports were entered at New York, already the domestic trade center for the commodity; while all except seven tons of the remainder was imported through Boston, where a total of only 500 tons was brought in during the period.

## Summary of Gross Imports of Rubber and Gutta Percha

The summary table below indicates that the United States rubber industry required 25 years to reach an annual import figure of 1,000 long tons of rubber, but only another 20 years to bring its annual imports to approximately 5,000 long tons. Note, however, that from 1854 to 1858 the imports declined over 63%, then doubled in volume from 1858 to 1860, then declined 47% from 1860 to 1862, before resuming their upward trend, which was sustained except for the years 1865, 1866, and 1869.

The table reflects the imports of unvulcanized rubber shoes and other articles as well as crude rubber up to 1855, but does not include imports from United Kingdom or Europe prior to 1855. The influence of the rubber boom of the early thirties; the rapid growth of imports which took place after manufacture under Charles Goodyear's vulcanization process was begun in 1843 and continued through 1854; the extremely sharp decline that followed the refusal of French and British courts to uphold Goodyear's patents in 1855, leading almost directly to the loss of American export trade in rubber products; the retarding effect of the Civil War and the loss of markets in the southern states on development of the industry, and its quick recovery and expansion after the close of that war, may all be noted in the table. The industry was still trying to recuperate after its loss of export trade as a result of the European failure of Goodyear's patents, when its progress was again interrupted by the Civil War. In the period from 1826 to 1870 total United States rubber imports amounted to about 52,000 tons, over half of which was imported in the last decade of that period.

ESTIMATED UNITED STATES GROSS IMPORTS OF RUBBER AND GUTTA PERCHA—1826-1871

| *Year | Long Tons | Value | *Year | Long Tons | Value |
|---|---|---|---|---|---|
| 1826 | 8 | $3,458 | 1849 | 570 | $318,759 |
| 1827 | 23 | 10,289 | 1850 | 613 | 343,316 |
| 1828 | 50 | 22,489 | 1851 | 1,221 | 684,764 |
| 1829 | 130 | 58,436 | 1852 | 1,078 | 603,072 |
| 1830 | 161 | 72,075 | 1853 | 1,648 | 922,602 |
| 1831 | 175 | 78,324 | 1854 | 2,895 | 1,944,999 |
| 1832 | 483 | 216,169 | 1855 | 2,464 | 1,660,141 |
| 1833 | 456 | 204,407 | 1856 | 1,554 | 1,045,576 |
| 1834 | 541 | 242,715 | 1857 | 1,237 | 832,058 |
| 1835 | 382 | 171,355 | 1858 | 1,052 | 708,231 |
| 1836 | 298 | 133,545 | 1859 | 1,462 | 983,944 |
| 1837 | 465 | 208,509 | 1860 | 2,120 | 1,427,142 |
| 1838 | 160 | 71,770 | 1861 | 1,870 | 1,245,373 |
| 1839 | 153 | 68,825 | 1862 | 1,110 | 728,230 |
| 1840 | 262 | 117,396 | 1863 | 2,290 | 1,476,140 |
| 1841 | 344 | 153,877 | 1864 | 2,815 | 1,702,741 |
| 1842 | 382 | 171,898 | 1865 | 1,760 | 1,223,055 |
| 1843 (9 Mos.) | 141 | 79,065 | 1866 | 1,913 | 1,459,586 |
| 1844 | 208 | 116,421 | 1867 | 3,320 | 2,388,288 |
| 1845 | 401 | 224,756 | 1868 | 3,789 | 2,192,691 |
| 1846 | 426 | 238,725 | 1869 | 3.488 | 2,505,632 |
| 1847 | 441 | 247,057 | 1870 | 4,296 | 3,459,665 |
| 1848 | 773 | 432,949 | 1871 | 4,925 | 4,390,776 |

*Years ended September 30 through 1842, then 9 months to June 30, 1843, then years ended June 30 through 1871. Calendar year summary data thereafter available.

## Estimated Reexports of Rubber—1855-1871

There is no way to estimate reexports of rubber from the United States prior to 1855 save through tabulation of imports into foreign countries so far as reported in their trade returns; such imports into England from the United States were mentioned in the previous article. Reexports as well as imports were reported from 1855 on, and the following table shows the value and estimated long tons from 1855 to 1867, fiscal years ended June 30; beginning 1868 the weight was also regularly officially reported. In some years this trade assumed considerable importance, European buyers resorting to the American market for Colombian caucho rubber, just as Americans bought African and Asiatic rubbers from England and other European countries to some extent. The tonnage estimates are at 30¢ a pound for years 1855 through 1860, for reexports of dutiable rubber in 1861, and for 1866 and 1867; for other years quantities were officially reported in pounds. Comparison of unit values of imports and reexports for 1869 and 1870 shows that prices for reexports in those years ran 5¢ to 8¢ a pound lower than

for imports, and this was likewise true of reexports of duty-free rubber in 1861, which indicates that reexports probably consisted of the lower grade rubbers. Practically all the reexports were from the port of New York, especially after the Civil War.

| Year | Long-Tons | Value | Year | Long-Tons | Value |
|---|---|---|---|---|---|
| 1855 | 310 | $208,996 | 1864 | 3 | $5,596 |
| 1856 | 179 | 120,802 | 1865 | 64 | 57,407 |
| 1857 | 96 | 64,491 | 1866 | 215 | 144,273 |
| 1858 | 147 | 99,053 | 1867 | 59 | 39,941 |
| 1859 | 181 | 121,777 | 1868 | 371 | 227,628 |
| 1860 | 447 | 300,915 | 1869 | 217 | 137,777 |
| 1861 | 632 | 404,065 | 1870 | 797 | 590,056 |
| 1862 | 201 | 208,094 | 1871 | 86 | 91,008 |
| 1863 | 3 | 6,867 | | | |

Estimated net imports amounted to 2,154 tons in 1855, declined to only 905 tons in 1858, rose to 1,673 tons in 1860, dropped again to 909 tons in 1862 when the Union cause appeared desperate, jumped to 2,812 tons in 1864 under the stimulus of war business in raincoats and other goods, suffered an after-the-war relapse to the 1860 level in the next two years, then increased to an average of 3,362 tons during 1867-1870, and enjoyed a further 50% increase in 1871.

## Losses Through Foreign Trade in Rubber Manufactures

The loss of business by American exporters after the manufacture of vulcanized rubber gained headway in Europe was far more than a mere incident of the trade, being very serious indeed in its proportions. This, no doubt, accounts for the bitterness of feeling that persisted for a long time between American and European manufacturers on the subject of vulcanization rights. Between 1855 and 1859 the loss of business amounted to no less than one-sixth of the total 1859 volume, based on census data for that year.

In 1855, as a result of foreign trade, the domestic industry enjoyed a production value of $1,385,164 worth of rubber goods *above* domestic requirements, but in the five years ended 1870, as a result of foreign trade, production of the domestic industry averaged $650,000 annually *less* than domestic market demand, a net loss of business of over $2,000,000 annually compared to 1855. It is scarcelv surprising that crude rubber was made free of import duty in 1871!

UNITED STATES BALANCE OF FOREIGN TRADE IN RUBBER MANUFACTURES—1855-1871

| Year Ended June 30 | Domestic Exports | Imports Less Reexports | Trade Balance |
|---|---|---|---|
| 1855 | $1,409,107 | $23,943 | +$1,385,164 |
| 1856 | 1,093,538 | 79,417 | + 1,014,121 |
| 1857 | 643,512 | 117,992 | + 525,520 |
| 1858 | 313,379 | 72,333 | + 241,046 |
| 1859 | 198,827 | 189,318 | + 9,509 |
| 1860 | 240,841 | 99,752 | + 141,089 |
| 1861 | 193,691 | 258,554 | — 64,863 |
| 1862 | 143,856 | 219,019 | — 75,163 |
| 1863 | 247,630 | 473,065 | — 225,435 |
| 1864 | 277,830 | 638,775 | — 360,945 |
| 1865 | 270,106 | 268,156 | + 1,950 |
| 1866 | 185,628 | 1,052,871 | — 867,243 |
| 1867 | 197,450 | 621,076 | — 423,626 |
| 1868 | 170,689 | 803,010 | — 632,321 |
| 1869 | 170,527 | 964,364 | — 793,837 |
| 1870 | 185,844 | 718,117 | — 532,273 |
| 1871 | 163,364 | 917,898 | — 754,534 |

(+)—Favorable; (—)—Unfavorable.

## Imported Rubber and Gutta Percha Goods Mostly from England

The greater part of the imports of rubber manufactures in the period following the Civil War came from England, but France, Germany, and Canada participated regularly to a less extent. It was in the seventies that Germany started that participation in export trade in rubber manufactures that made the Empire a leading competitor in international markets up to the outbreak of the World War. The following table shows the chief sources of the American imports from 1869 to 1875, during which period England was losing trade, while the other countries were gaining, in the American market.

## Growth of Industry Shown by Census Data

Meanwhile the decennial census had twice been taken, providing further information. The number of companies classified in the "india rubber goods" industry in 1859 was only 27, a reduction of seven from 1849, there having gone out of business three concerns in New York, two in Maryland, and one each in New Jersey and New Hampshire. The table (page 46) includes for 1859 certain other industries that were not afterwards separately reported, but were presumably included under the "india rubber and elastic goods" industry in 1869.

The census reports for 1849, 1859, and 1869 show costs of materials ranging from 51% to 54% of the value of products, and labor costs ranging from 14% to 18% of products, leaving 29% to 32% to cover overhead and profits. The average capitalization per company increased from $43,000 in 1849 to over $130,000 in the two succeeding census years; the average production per plant increased from $89,000 in 1849 to $209,000 in 1859 and $260,000 in 1869; the average number of employes per factory increased from 75 to 103 to 108; and the "average wage" per employe climbed from $209 in 1849 to $286 in 1859 and to $425 in 1869 after the war. The number of companies engaged in the business increased greatly between the years 1859 and 1869, even allowing for the broader coverage of the industry under the census classification, and the industry value of products enjoyed over 100% increase in each successive decennial census, despite the loss of foreign trade.

## New York Leading State in 1869 Rubber Consumption

The census report on the rubber industry for 1869 set several precedents. It provided information on the consumption of rubber, cloth, cotton and other materials, setting a precedent followed subsequently only after the lapse of over a half century. The secretive manufacturers of that day when every formula was closely guarded, of course did not divulge the nature of any of the chemical compounding materials which they employed, these being included under the value of "other materials not specified" which accounted for 13.5% of the total cost of materials.

The table shows the available data by states in com-

| | 1869 | 1870 | 1871 | 1872 | 1873 | 1874 | 1875 |
|---|---|---|---|---|---|---|---|
| Canada | $921 | $248 | $3,298 | $8,490 | $24,950 | $25,218 | $10,954 |
| United Kingdom | 906,205 | 646,034 | 873,954 | 784,721 | 714,733 | 598,384 | 336,438 |
| Germany | 8,142 | 13,048 | 10,811 | 23,120 | 112,012 | 129,373 | 112,248 |
| France | 15,921 | 74,831 | 27,987 | 63,209 | 46,365 | 50,748 | 54,054 |
| Other | *33,487 | 1,875 | 5,024 | 1,918 | 2,127 | 107 | 285 |
| Total | $964,676 | $736,036 | $921,074 | $881,458 | $900,187 | $803,830 | $513,979 |

*1869 imports from "other countries" included $26,964 from British and Dutch East Indies and $4,551 from Tropical America, possibly unmanufactured.

1859: Census Data on United States Rubber Industry

| Industry | Companies | Capital | Employes | Wages | Materials | Products |
|---|---|---|---|---|---|---|
| Comb plates | 1 | $1,000 | 3 | $1,080 | $1,200 | $2,700 |
| Gutta percha goods | 2 | 100,000 | 34 | 21,600 | 69,000 | 125,750 |
| India rubber goods | 27 | 3,534,000 | 2,768 | 794,570 | 3,056,360 | 5,642,700 |
| Suspenders | 4 | 341,200 | 482 | 95,460 | 243,522 | 633,000 |
| Webbing | 10 | 202,400 | 279 | 63,492 | 131,216 | 303,010 |
| | 44 | $4,178,600 | 3,566 | $976,202 | $3,501,298 | $6,707,160 |

1869: Census Data on United States Rubber Industry

| Industry | Companies | Capital | Employes | Wages | Materials | Products |
|---|---|---|---|---|---|---|
| India rubber and elastic goods | 56 | $7,486,605 | 6,025 | $2,559,877 | $7,434,742 | $14,566,374 |
| Insulated wire | 2 | 12,000 | 11 | 4,800 | 8,960 | 27,817 |
| | 58 | $7,498,605 | 6,036 | $2,564,677 | $7,443,702 | $14,594,191 |

1869 Materials Used in Rubber Manufacture

| | Factories Number | Rubber Pounds | Cloth Yards | Cotton Pounds | Silk and Yarn Pounds | Other Value | Total Value |
|---|---|---|---|---|---|---|---|
| Connecticut | 13 | 2,473,902 | 325,500 | 2,201,950 | 39,000 | $592,889 | $2,355,488 |
| Maine | 1 | ...... | ...... | ...... | ...... | 20,425 | 20,425 |
| Massachusetts | 16 | 1,038,393 | 372,300 | 126,501 | 256,908 | 160,739 | 1,554,006 |
| Missouri | 1 | ...... | ...... | ...... | ...... | 1,500 | 1,500 |
| New Jersey | 12 | 1,260,795 | 761,377 | 2,000 | ...... | 142,054 | 1,284,967 |
| New York | 10 | 2,745,470 | 951,490 | 61,000 | 1,500 | 58,096 | 1,316,803 |
| Pennsylvania | 1 | ...... | ...... | ...... | ...... | 500 | 500 |
| Rhode Island | 2 | 894,760 | 523,908 | ...... | ...... | 127,590 | 901,053 |
| | 56 | 8,413,320 | 2,934,575 | 2,391,451 | 297,408 | $1,003,793 | $7,434,742 |

1869 Production of Rubber Goods

| | Suspenders Dozens | Belting and Hose Pounds | Boots and Shoes Pairs | Car Springs Pounds | Coats Number | Fabrics Yards | Packing Pounds | Other Value |
|---|---|---|---|---|---|---|---|---|
| Connecticut | 294,000 | ...... | 2,155,120 | ...... | ...... | ...... | ...... | $1,325,552 |
| Maine | 9,000 | ...... | ...... | ...... | ...... | ...... | ...... | ...... |
| Massachusetts | 172,000 | ...... | 1,127,700 | ...... | ...... | 692,187 | ...... | 688,076 |
| Missouri | 1,500 | ...... | ...... | ...... | ...... | ...... | ...... | ...... |
| New Jersey | ...... | ...... | 1,070,102 | ...... | 30,000 | 64,500 | ...... | 1,067,538 |
| New York | 75,000 | 906,000 | 150,000 | 1,250,000 | ...... | 500,000 | 91,127 | 1,205,001 |
| Pennsylvania | ...... | ...... | ...... | ...... | ...... | ...... | ...... | 1,400 |
| Rhode Island | ...... | ...... | 899,744 | ...... | ...... | ...... | ...... | 853,124 |
| | 552,500 | 906,000 | 5,402,666 | 1,250,000 | 30,000 | 1,256,687 | 91,127 | $5,140,691 |

plete detail; note that rubber consumption was reported only by factories in New York, Connecticut, New Jersey, Massachusetts, and Rhode Island (in order of importance), firms in other states apparently making suspenders from rubberized fabrics produced elsewhere. It would appear that Connecticut factories in particular had their own cotton spinning mills, in view of the cotton consumption reported.

## Broad Diversification of Products

The precedent established for reporting products of the industry in some detail is much more helpful. Rubber boots and shoes were the leading item with a production of over 5,400,000 pairs. Suspenders possibly ranked second among listed products with over 550,000 dozens; and fabrics (including elastic webbing as well as cloth waterproofed with rubber) no doubt ranked third with over 1,250,000 yards. Car springs for railway cars were the leading item in mechanical rubber goods with 1,250,000 pounds; belting, hose, and packing combined totaled less than 1,000,000 pounds, all in New York. Only 30,000 rubberized coats were reported, produced in New Jersey. The other products of the industry included an important output of druggists' and stationers' rubber sundries, rubber balls and toys, and hard rubber goods, but these were included with other specialties in the "all other" item, reported by total value only. Two firms were engaged in production of insulated wire, and the value has been reported above.

The industry had now attained a production value, wholesale, of $14,594,191 and a diversification of products already a harbinger of the future. Rubber footwear and apparel, rubberized and elastic fabrics, mechanical rubber goods, druggists' and stationers' rubber sundries, toys and balls, hard rubber goods, and insulated wire constitute a representative classification of rubber articles for this entire year when the first bicycles were just being introduced. The industry was now prepared for the broader service which it has been undertaking ever since as it has entered more and more new fields.

## Adhesive Plaster Recommendation

Simplified Practice Recommendation R85-37,[1] first revision of the adhesive plaster program, became effective December 15, 1937, covers a simplified schedule of stock widths and lengths of adhesive plaster in rolls and on spools, and was promulgated originally in September, 1928, following a conference of adhesive manufacturers, distributers, and users. A survey revealed adhesive plaster was being manufactured in 26 sizes. After studying the survey data the conference approved a 15-size schedule as adequate to supply all normal requirements.

The recommendation in its original form was reaffirmed in 1929, 1931, and 1934 by the standing committee of the industry, created by the general conference to keep the program abreast of new developments. The current revision, approved by the committee in August, 1937, concerns adhesive plaster in rolls and provides for adding an item in active demand and eliminating one of negligible consumption.

Besides the schedule of stock widths and lengths of adhesive plaster the revised printed issue will include a brief history of the development of the project, the present membership of the standing committee, and a list of acceptors of the recommendation. Until the printed recommendation is available, free mimeographed copies may be obtained from the Division of Simplified Practice, National Bureau of Standards, Washington, D. C.

[1] From "Simplified Practice Recommendation for Adhesive Plaster," *Tech. News Bull.*, Nat'l. Bur. Standards, Jan., 1938, p. 7.

# The Price Cycle during Crude Rubber Restriction

Harold G. Rogers

A COMPARISON of crude rubber prices during two periods of restriction is an impressive one since there is enough similarity to suggest that regulation has caused prices to move in nearly parallel cycles.

The adoption of the Stevenson Act on November 1, 1922, represented the first effort on the part of crude rubber producers to obtain restriction by government decree. The most important features of the plan were also its chief defects, in that it was inelastic, with the increases and decreases in allowable exports strictly based on a pivotal price for rubber. Secondly, was the fact that it applied only to British planters who represented but 65% of total world rubber production. With the higher prices which resulted during the earlier phases of restriction, native production and European planting were tremendously stimulated in the Dutch East Indies, and British control of world rubber production lowered to about 55% by the time the act was terminated on November 1, 1928. Prices ended up by being about the same as they were in the beginning, around 20¢.

The end of this first attempt at government restriction was followed within two years by the world-wide depression which saw crude rubber prices decline to their lowest point in history, at 2.5¢ per pound. It was a continuation of this low level, through 1932 and 1933, which led to agitation for and final adoption of the current scheme on June 1, 1934. The latter act represents 95%

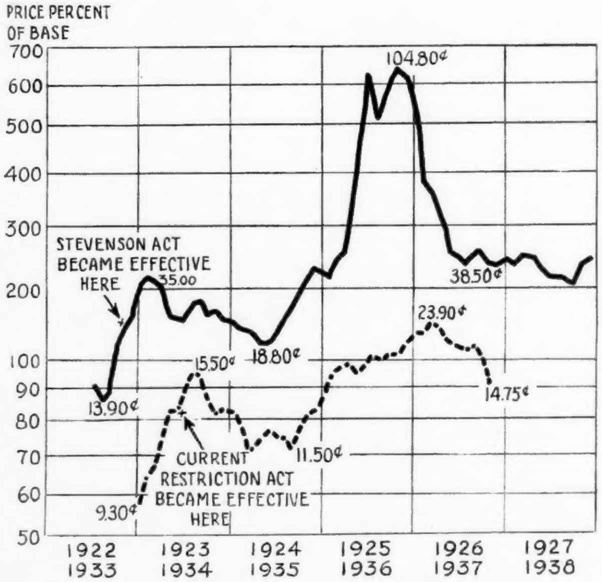



Fig. 1. Comparative Movement of Crude Rubber Prices during Two Periods of Restriction

Base: January 1, 1921, to June 30, 1922=100%

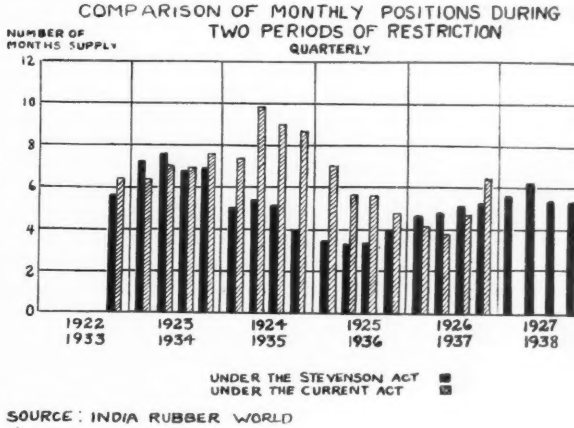



Fig. 2

of world rubber production and is to remain in effect until December 31, 1938.

The heavy solid line in Figure 1 represents the movement of prices during the Stevenson Restriction Act. The heavy dotted line shows the price trend to date under the current scheme. The 18-month period from January 1, 1921, to June 30, 1922, has been selected as a base, equal to 100%. The advantage of this particular base period is in the fact that prices were relatively steady at that time, the average of 16.2¢ representing fluctuations within the comparatively narrow limits of 18.75¢ and 14.5¢. All price movements shown by the two curves have been calculated as percentages of that base.

Since the general level of prices during the Stevenson Act was much higher than it has been under the current scheme, a comparison from a dollar and cents standpoint will have little significance. The actual prices are only of interest, indirectly, as they aid in the interpretation of the long-time movements.

The first example of similarity in price trend is noticeable several months before either restriction scheme actually went into effect. On the upper curve prices rise from 13.9¢ to 35¢ within a period of six months. On the lower curve the rise is from 9.3¢ to 15.5¢ within a period of seven months. While both upward movements were warranted by decreases in world rubber stocks during the corresponding months, the most important influence for higher prices was undoubtedly speculative in nature, the attempt of active traders to anticipate the long-time effect of restriction.

As the market had discounted the fact of restriction several months in advance, the next move of both curves is downward. On the upper curve prices fall from 35¢

to 18.8¢; on the lower curve from 15.5¢ to 11.5¢. In this general movement the time element is of interest, the length of the declines being 14 months and 13 months respectively. In the case of the Stevenson Act this prolonged movement toward lower prices was not in keeping with the statistical position since the supply of rubber on hand was declining at the same time. Under the present scheme prices reacted more truly in accord with the monthly stock position because supplies on hand were at 6½ months at the beginning, but had increased to 8½ months by the time the movement ended. (See Figure 2.)

Drastic reductions in the export quota rates, to 50% under the Stevenson Act and to 60% under the current act, at this point in the cycle, started the third major price movement in an upward direction. The upper curve rises sharply for 17 months, prices going from 18.8¢ to 104.8¢. The lower curve rises sharply at first and then more gradually over a period of 18 months, prices going from 11.5¢ to 23.9¢. In both cases the monthly stock position was about 3½ months' supply at the end of the period. The greater degree of price rise under the Stevenson Act was partly due to lack of confidence in the restriction scheme itself and the belief by speculators that there would be an eventual world shortage of crude rubber.

When this shortage failed to materialize, prices declined for nine months under the Stevenson Act and then followed with an 18-month period of steadiness, wherein fluctuations were within the comparatively narrow limits of 42.5 and 32.5¢. During the corresponding period under the present act prices have fallen from 23.9¢ to 14.75¢. This decline has continued for eight months, and while it does not necessarily follow that an 18 months' period of steady prices is the outlook at this point, under current conditions, it does seem logical that some degree of steadiness should develop in the present market, because of the sharpness of the decline. A fair estimate would be that the low stage of this fourth period in the current cycle should be either in November or December of this year and on the basis of comparative range in past fluctuations a price between 14 and 18.5¢ maintained for a period of at least six to nine months.

The soundness of such a forecast might be questioned if some of the more practical factors in the situation were not introduced in support of this conclusion. How did the supply of rubber at this point, under the Stevenson Act, compare with the supply on hand at the present time? The fact is the statistical position at this period under the earlier act was a little more favorable at five months' supply than under the current scheme at about six months' supply. What was the regulative action of both committees after prices had dropped for nine and eight months respectively? The Stevenson Committee reduced the export quota rate from 100% to 80% on October 30, 1926; the International Rubber Regulation Committee reduced its quota rate from 90% to 70% on November 30, 1937.

While it is not the purpose of this analysis to go into a detailed estimate of future world production and consumption trends, it is worth noting the fact that the new quota rate of 70% should provide for the export of about 500,000 tons of crude rubber during the first half of 1938. It is quite obvious at this time, too, that world consumption will fall behind the 582,000 tons consumed during the first half of 1937 by at least 10% to 15%. On this basis world consumption during the corresponding period in 1938 should be in the neighborhood of 500,000 tons, and such near balance in supply and demand lends support to the earlier conclusion that an extended period of steady prices, moving within about a 4¢ range, is due at this point in the price cycle under the current restriction scheme.

Whether the previously described parallelism to date in the two cycle movements has been due primarily to the temporary suspension of the normal laws of supply and demand, or whether it is the result of the release of certain psychological factors, such as fear of a rubber shortage on the part of consumers, or over-optimism or pessimism as to the effects of restriction on the part of dealers and producers, or the natural reaction of a committee of human beings to certain market developments, is beside the point. The fact remains that similarity has existed up to the present time, as far as the two price cycles are concerned, and there is enough substantial evidence, both from a psychological and practical standpoint, to conclude that the cyclical movement of prices, as well as other factors, should be taken into consideration in any forecast for 1938.

## Export Trade in Rubber Products Greatly Exceeds Imports

United States exports of rubber manufactures amounted to $27,056,871 in the first 10 months of 1937, as compared with $19,624,762 in the same months of 1936, an increase of 37.9%. Imports of such goods were valued at only $1,750,998 in the current period and at $1,725,662 in that of 1936, indicating an increase of but 1.5% this year.

Principal import items are scrap and old rubber, $388,480; belts and belting of fiber and rubber, $202,596; and rubber-soled footwear with fabric uppers, $189,371; the figures are for the first 10 months of 1937. Export items in the same period were tires, inner tubes, and tire repair materials, $13,392,461; mechanical rubber goods, $4,701,915; scrap and old rubber and reclaimed rubber, $3,055,696; specialties and sundries, $2,093,203; rubber footwear $1,008,582. *Commerce Reports.*

## Tensile Machines

*(Continued from page* 38)

or short, elastic or rigid, ductile or plastic. At the present time this principle has been used by the Henry L. Scott Co. in machines which provide a maximum pull of 55 pounds.

In Figure 8 is shown a machine designed primarily for testing rubber thread, but also suitable for use with lightgage broad-end specimens requiring a pull up to 20 pounds. Compensation-for-gage can be accomplished by altering the weight of the carriage. In addition to tensile and elongation this machine provides for fatigues for any predetermined load, numerous repeats, and ultimate tensile with permanent records on a rectilinear coordinate ruled chart.

Owing to the flexibility and precision of machines built on the incline plane principle it is believed that the constant specimen rate-of-load method of testing will be adopted extensively in the future.

# Some Properties of Jelutong Latex

**F. K. Daniel, H. Freundlich, and K. Söllner**[1]

SPENCE and van Niel[2] have found that the rubber particles in Hevea latex may be oxidized to resinous matter by the oxygen of the air in presence of bacteria. We observed in Jelutong latex a similar oxidation of rubber hydrocarbon, obviously due to some bacterial or enzymatic action. The rubber in the coagulum of Jelutong latex is known to be easily oxidized by air, forming resinous matter.[3] Before discussing the oxidation of rubber in Jelutong latex we would like to deal with some properties of this latex and the way we separated the rubber from the resins.

## Composition and General Properties

Jelutong latex, the milky sap of Dyera costulata and Lovii, is more a resin than a rubber system. An analysis was done shortly after tapping. Out of 25.2% of the total dry content of the latex only 5.35% is insoluble in acetone. Hence 19.85%, i.e., nearly 80% of the solid matter, consists of resins or resin-like substances, and not even the whole rest is pure rubber hydrocarbon; for water soluble substances like salts, sugars, etc., further impurities like sand, etc., remain in the fraction insoluble in acetone.

The sample we investigated was collected in Johore, Malaya, from one single tree which had not been tapped for one year. The sap exuded for three hours, and 1.7 liters were obtained. Three hundred millimol of ammonia per liter were added to it soon afterward. A small sample of the freshly tapped latex, kept without ammonia, had coagulated after three days; whereas we received the ammonia-preserved sample six weeks later in perfectly good condition, i.e. as a stable, very white, and comparatively little viscous dispersion. No coagulation, neither macroscopic nor microscopic, had occurred. Only single particles in vivid Brownian movement were observed under the microscope. They are distinctly smaller than Hevea particles, viz: not larger than 1.0 to 1.5 in diameter, and a large fraction can be seen under the ultramicroscope only.

Unlike Hevea latex, Jelutong latex does not behave as an ampholyte, i.e., the charge of the particles cannot be reversed by an excess of H'-ion like that of Hevea particles. This was proved by electrophoretic measurements. The particles of Jelutong latex are negatively charged, when in alkaline solution, and are only discharged, but not positively recharged by H'-ions. When acid is added to the Jelutong latex, macroscopically no change whatsoever is to be noticed at first; only in the course of 24 hours or more coagulation occurs. But instead of a lump of rubber floating on the top of the liquid as with Hevea, one finds a sediment which is sticky and more plastic than elastic. Under the microscope an aggregation of 10 to 12 particles in the average is observed shortly after adding the acid, and in slides with cavities these aggregates can be seen sinking down very slowly.

## Particle Composition

Sedimentation is due to the presence of resins in the coagulum. If the resinous constituents of the latter are extracted with acetone, the remaining rubber hydrocarbon floats on the top of the Jelutong serum. Resins have usually a higher specific gravity (between 1.02 and 1.18) than rubber (0.92 to 0.96), as was also found by Frey-Wissling[4] when investigating different species of Hevea latex.

The author, just mentioned, was able to prove that in Hevea latex the rubber particles are independent of the particles consisting of resinous matter. If this were also true for Jelutong latex, one would have to assume that the greater number of heavier resin particles pull down the smaller number of lighter rubber particles, when united to aggregates. This assumption turned out to be incorrect: Jelutong latex does not contain two independent types of particles. On centrifuging the alkaline latex, containing single particles only, no separation into two different layers—a heavier sediment of resinous matter, a lighter cream of rubber—occurs. After centrifuging the stable latex (at 2,700 rev./min.; r.=18 cm.) for one hour, only a layer of sediment is obtained, a fairly large number of the particles remaining evenly distributed in the serum. The specific gravity of the latter is not different from that of the sedimented particles, i.e., both types of particles do not differ as to their chemical nature. For when coagulated by acetic acid, the residue of suspended particles sediment like the particles of the whole latex, and the product formed is identical with that of the whole latex, i.e., it is the same sticky and plastic mass, not a more elastic and rubber-like one, as should be expected if it contained a higher proportion of hydrocarbon than the particles which had been removed by centrifuging. Hence we must conclude that all particles are composed of both hydrocarbon and resin.

## Oxidation

In Jelutong latex the relation between rubber and resins appears to be different from that in Hevea latices. We have not been able to explain it fully, but it could be shown that the rubber in Jelutong, known to be easily oxidizable, is oxidized in the alkaline latex in course of time to resinous substances. This may favor the assumption that the rubber particles in Jelutong are coated by a layer

[1] The Sir William Ramsay Laboratories of Inorganic and Physical Chemistry, University College, London, England.
[2] Spence and van Niel, *Ind. Eng. Chem.*, 28, 847 (1936). Cf. also O. de Vries, *Centr. fr. Bakt. Parasitenk. Infek.*, 74, 22 (1928).
[3] M. L. Hamlin, U.S. patent No. 1,674,435, (1928). Cf. also C.D.V. Georgi, *Malayan Agr. J.*, 16, 204 (1928).
[4] A. Frey-Wisslin, *Mededeel. Algem. Proefsta. Avros.*, 13, 24 (1929).

of resins; in extreme cases the layer may be so thick that the particles practically consist of resinous matter alone. This oxidation of the rubber in Jelutong latex is specially interesting in view of the results of Spence and van Niel mentioned above.

### Separation of Rubber from Resins

The reaction between rubber and oxygen was observed when separating rubber from resins in Jelutong latex which had been exposed to air for a different length of time. The method used for separation has been described more fully in another paper,[5] hence it may be sufficient to mention the main points. All latices, investigated so far, may be coagulated quickly by shaking them after dilution vigorously with a polar-nonpolar liquid, which is not miscible in all proportions with the aqueous system, e.g., isobutyl alcohol, cyclohexanol, etc.; when the emulsion formed separates, after shaking has stopped, the rubber is generally found as a lump on the interface of the two liquids. With Jelutong latex it is advisable to use liquids which dissolve resinous matter readily and do not let the rubber particles swell too quickly; isobutyl- and isoamyl alcohol are suitable substances. If Jelutong latex is treatd in this way with one of these two organic liquids, a strongly elastic lump of rubber[6] remains on the interface; the resins are dissolved (or peptized) in the organic liquid and appear, after the liquid has been evaporated, as a perfectly transparent mass, without any yellow component, insoluble in water, hard, dry, and not at all sticky (at room temperature). If Jelutong latex is coagulated with acetic acid, rubber plus resins appears as a sticky, more plastic than elastic sediment, as was mentioned above.

### Effect of Exposure to Air

An easy separation of rubber and resins, as described just now, was successful with a Jelutong latex preserved with ammonia which had been kept, after being tapped, for about six weeks in a well closed vessel. We repeated the process about ten months later with the same sample. It was still a stable dispersion containing mainly single particles and differing from the fresh latex by a slightly more yellowish appearance; but the bottle had been frequently opened; hence the latex had always been in touch with fresh air. With this sample no rubber product was obtained. Instead, a small amount of a very sticky, greasy, yellowish mass was coagulated which did not dissolve truly in iso-butanol, but swelled in it considerably; if the iso-butanol was evaporated, the remaining product was not dry and hard, like the resins obtained from the organic phase of the fresh latex, but was soft and sticky like the well-known pathological resins.

The rubber must have been transformed, partly, into a product which is resin-like, but substantially different from the resins present in fresh Jelutong latex. The quantity of coagulate, using the aged latex, is smaller than the quantity of rubber obtained from the same amount of fresh latex by the same process. Hence another part of the rubber transformed must have become soluble in the iso-butanol or in the aqueous phase or in both. Probably the yellowish appearance of the old latex is due to such a water soluble decomposition product. This colored substance is dissolved in the alkaline serum of the old latex; it is precipitated in acid medium and goes into the organic phase, if present. It is a good emulsifier. Removed with the (alkaline) aqueous phase and dried, it turns out to be a soft resin-like substance, which we assume to be a resin soap, (probably an $NH_3$ soap produced by the ammonia present in the Jelutong latex). On adding acid the water insoluble resinic acid is formed. This is the substance contained in the coagulum and causing its yellow appearance, when the process of separation is carried out in acid medium. If it is done in alkaline medium, the substance remains in the aqueous phase and the coagulum looks much lighter. Owing to this substance the two liquid phases do not separate readily, but remain emulsified in the case of the old (decomposed) latex, in contrast to their behavior in fresh latex, thus making our method of separation and coagulation rather ineffective. This emulsifying capacity clearly distinguishes the resinic acids and soaps present in the old Jelutong latex from those in fresh latex.[7]

### Effect of Exclusion of Air

A bottle of Jelutong latex from exactly the same origin as the first sample, only kept sealed up all the time in the bottle in which it had been sent from the tropics, was opened ten months after the first sample had been opened. Its content was treated according to our method of separation. It behaved exactly like the latex from the first bottle had behaved ten months earlier, i.e., a dry, elastic rubber was obtained. This makes it obvious that the rubber originally present in the latex is transformed in course of time, provided that fresh air is admitted. An underpressure in the bottle was regularly observed, when it was opened in intervals of some weeks. Hence it is very probable that the oxygen from the air oxidizes the rubber hydrocarbon.

### Catalytic Effect of Enzymes

This is, of course, no direct oxidation of the rubber. We may conclude this from the behavior of the latex toward $H_2O_2$, for instance. If the latter is added and the mixture heated up for a few minutes or kept at room temperature for several days, no change whatever in the properties of the coagulum is observed.

The oxidation can only have been caused by enzymes of bacterial or of vegetable origin. This is shown by the fact that a sample of Jelutong latex which had been sterilized at 120°C. for four hours and left open still contained rubber after many months; whereas a sample of not sterilized latex did not contain rubber any more. This experiment proves that in the latex catalysts, sensitive to high temperatures, are acting as oxidizers, and that one may exclude catalysts, not sensitive to high temperatures.

Remembering the results of Spence and van Niel it would be interesting to see whether the enzymes probably present in Jelutong latex itself, and not brought into it after tapping, can accelerate the oxidation of the rubber in Hevea latex too, i.e., whether the addition of Jelutong to Hevea latex may act like actinomyces in the experiments of Spence and van Niel.

Most likely the oxidation and hence the transformation of the rubber in Jelutong latex into a resinous substance starts at the surface of the particles. We, therefore, prefer to assume that the particles in this latex have a nucleus of rubber surrounded by a coating of resins of varying thickness. The other alternative: that in fresh latex both components are mixed in an irregular way in each particle, appears to be less probable. This reasoning is, however, not absolutely conclusive. As mentioned

[5] F. K. Daniel, H. Freundlich, and K. Söllner, unpublished paper.

[6] The excellent qualities of Jelutong latex have been mentioned in the literature: cf. Ph. Schidrowitz, "Rubber," London, 1911, p. 119; E. A. Hauser, "Latex," Dresden and Leipzig, 1927, p. 47.

[7] Hamlin (*loc. cit.*[3]) already came to the conclusion that the resinous substance formed by the oxidation of the rubber differs from the resins produced in the tree. He notices that the former had a certain odor and a bitter taste, not found in the original resins.

above, the resinous matter found in the oxidized alkaline latex differs distinctly from the resins present in the fresh Jelutong latex; the former, for instance, strongly favors the emulsification of organic liquids in the latex; the latter do not. Hence the distribution of rubber and resins in the particles might also be different in the tree than when the resinous matter is formed outside.

## Coagulation Phenomena

As was mentioned above, Jelutong latex is coagulated slowly by acetic acid. This small speed of coagulation is due to several causes. The particles of this latex, being a mixture of rubber and resins, have a specific gravity which differs only slightly from that of the serum. This is proved by the fact that on centrifuging the diluted alkaline latex at 2,700 rev./min. (r. = 18 cm.) for one hour, only a part of the particles is separated from the liquid; whereas Hevea, treated in the same way, is markedly separated to a cream and a serum. The small difference in specific gravity between Jelutong particles and serum affects their coagulation in an indirect way: if all particles sediment slowly, the influence of orthokinetic coagulation[8] is negligible, i.e., of the coagulation due to the collisions of particles of different size which move with different velocity.

The number of irreversible collisions of discharged particles in a given time seems to be much smaller with Jelutong than with Hevea latex. As was mentioned in a previous paper,[9] nearly all collisions of properly discharged Hevea particles result in irreversible aggregation. When discharged Jelutong particles are observed under the microscope, they seem to stick together much less frequently, many collisions being reversible. Hence the Jelutong aggregates do not grow larger and larger (like Hevea aggregates) during the time they are under microscopic observation.

This difference in behavior is not easily accounted for. It might be due to a difference in the consistency of the particles, those of Jelutong being more rigid. There might also be a difference in the way the particles are protected. The following observation is perhaps in favor of the latter assumption. As was mentioned above, treating Jelutong latex with $H_2O_2$ does not affect the properties of the coagulum produced by shaking with organic liquids; the rate of coagulation with acetic acid, however, is increased markedly, if the latex has been treated with $H_2O_2$, before adding the acid: it may be coagulated in 10 to 20 minutes, or even quicker, if being shaken. This is readily explained by assuming that $H_2O_2$ destroys the substance protecting the Jelutong particles.

## Summary


1. Jelutong latex preserved with $NH_3$ shows no ampholytic behavior; its particles are only discharged, not recharged positively by adding acids.
2. This latex, known to hold an excess of resins compared to the amount of rubber, does not contain two different types of particles, lighter rubber and heavier resin particles, but only one type, the specific gravity of which is slightly higher than that of the serum.
3. If air is admitted to it, Jelutong latex is transformed in course of time: the hydrocarbon is oxidized to a resin-like substance which is, however, distinctly different from the resins found in fresh latex. The transformation is not an autoxidation process, but one caused by the action of enzymes; it does not go on, if the latex is sterilized by heating to a higher temperature.
4. A method of coagulating the latex quickly and separating the resins from the rubber consists in shaking the latex for some seconds, with certain polar-nonpolar liquids forming a second liquid phase, such as isobutyl or isoamyl alcohol. A lump of rubber is accumulated at the interface of the two liquids; the resins are contained in the organic phase.
5. Jelutong latex is coagulated very slowly on adding acetic acid, a fact probably due to several causes: the irreversible aggregation is slow, only a small fraction of collisions between the particles resulting in coherence; furthermore the difference in specific gravity between particles and serum is slight.


[8] P. Tuorila, *Kolloidchem. Beihefte*, 24, 1 (1927).
[9] F. K. Daniel, H. Freundlich and K. Söllner, *Trans. Faraday Soc.*, 32, 1570 (1936).

# Sponge Rubber

(*Continued from page* 40)

vulcanization to produce a hard rubber, to a surrounding atmosphere of a carbon-dioxide-containing gas to secure absorption of the gas within the mass of rubber, diminishing the pressure to secure the expansion of the mass and the formation of a multitude of cells therein, and vulcanizing the mass to its hard rubber stage.

50. Twiss, 1,966,271, July 10, 1934. The process of fireproofing sponge rubber comprises soaking the rubber in a solution of ammonium chloride, ethylene glycol, glue, and an antioxidant, squeezing part of the solution from the rubber, and drying the rubber.

51. Howard, 1,966,818, July 17, 1934. A process for the manufacture of molded spongy rubber from a concentrated aqueous dispersion containing rubber consists in admixing with the aqueous dispersion a volatile rubber solvent in a quantity to cause swelling and setting of the dispersion, partially filling a mold with the mixture, wetting the entire molding surface of the mold with the mixture, and allowing the mixture to swell and set in the mold.

52. Dodge, 1,978,041, Oct. 23, 1934. The method of making rubber strip material comprises coating a substantially inextensible sheet of fibrous material with a layer of sponge rubber composition, applying pressure along the face of the sheet to form the coating into parallel longitudinal strips, effecting sponging and vulcanization of the material in the strips, and then separating the sheet along lines between the strips.

53. Madge, 1,980,813, Nov. 13, 1934. A process for manufacturing microporous articles of vulcanized rubber material from an aqueous dispersion comprises mixing in the dispersion a member of the group of reagents consisting of the sulphates, chlorides, nitrates, and acetates of the alkali metals including ammonium which do not gel or coagulate the dispersion in the quantity present therein, and a member of the group of reagents consisting of the oxides and hydroxides of di- and tri-valent metals which by interaction produce products in situ which in the quantity added at an elevated temperature gel the dispersion to form a continuous medium of the rubber material containing microscopic particles of aqueous liquid, and thereafter vulcanizing the products obtained under such conditions that evaporation of contained liquid is prevented.

(*To be continued*)

# Editorials

## Export Statistics

IN GENERAL those in charge of preparing export documents required for clearance of export shipments are prone to regard the details as of importance only to the government representatives directly associated with the shipments and in many cases illegible, insufficient, or inaccurate information is the result.

Statistics relating to classification and quantity of merchandise exported are compiled from these export documents and are distributed periodically by the Department of Commerce for the use and benefit of American export shippers. Direction of a sales staff abroad or relations with foreign agents as well as decisions as to production for export shipment can be ably assisted by the availability of dependable export statistics. The resulting decisions can be no more accurate than the data in the documents from which they are taken. Thus the effect of errors or omissions automatically returns to influence wrongly the exporter in the conducting of his own business.

Investigation indicates that in previous years a large proportion of the errors revealed in export statistics have resulted from carelessness or disregard of regulations and instructions on the part of the shippers. There is now available from the Department of Commerce, a revised edition of Schedule B, the Statistical Classification of Domestic Commodities Exported from the United States and Regulations Governing Statistical Returns of Exports of Domestic Commodities, effective January 1, 1938.

Exporters can increase the effectiveness to themselves of available export statistics by following the methods and intent of these instructions when supplying export declarations. Likewise the officials of exporting organizations can effectively supplement the efforts of government offices by frequently checking on their shipping departments or on the agents and freight forwarding companies that handle their business to insure proper consideration of their documents.

## Rubber at 1939 Expositions

PREPARATIONS are now being made for extensive expositions at New York and San Francisco in 1939. At previous fairs of this nature numerous industrial companies including some producers of rubber products have individually sponsored displays exemplifying the products, production processes, or other activities related to the individual company and the industry to which it belongs. Doubtless some rubber companies will exhibit at the approaching expositions in 1939.

More pronounced benefits to the individual companies and to the rubber industry as a whole can be obtained by concentrated exhibits in a group location than as individual displays without thought being given to related continuity. Is it not possible in 1939 that exhibits by those companies intending to take space can be coordinated so as to retain their individuality and at the same time present a comprehensive and connected panorama of the rubber industry so as to be of interest to the visitors?

Can not the advertising value to each company be increased by a collective selection of the phases to be represented so as to create an impressive and complete realization of the varied processes and methods required in producing the numerous rubber products which are available as necessities and conveniences to the people?

Romance, which increases public interest, in technical or constructional subjects, can be very aptly included in such a program in 1939 as a centennial in the historical development of the industry since the first vulcanized rubber was obtained. The rubber industry is capable of organizing a creditable manifestation of its importance in social and economic phases of national life. Those who contemplate participation in the expositions are urged to give consideration to such a cooperative demonstration.

## Risk in Business

BUSINESS or Commerce is the basis for the high economic and social order which has operated in the past to provide the American people with a better standard of living than is experienced in any other country. Disparaging statements often made regarding American business operation indicate a misunderstanding as to the percentage of successful business undertakings to the total. Few realize the tremendous risk taken by investors and management when instituting new enterprises.

Of 20,000 representative companies operating during the prosperous five-year period, 1924 to 1929, 48% experienced losses, while 32% made a profit of less than 6%, and only 20% of the companies showed a profit greater than 6%. On the average, from a group of newly formed businesses, only 10% survive a two-year period and 5% remain at the end of five years.

S. C. Stillwagon

EDITOR

# What the Rubber Chemists Are Doing

## A. C. S. Rubber Division Activities

### Los Angeles Group

THE Los Angeles Group, Rubber Division, A. C. S., held its first monthly meeting of the year on January 4 in the Rainbow Room of the Mayfair Hotel in Los Angeles, Calif. In the absence of the new chairman, Ed Royal, the meeting was called to order by Vice Chairman Garvin Drew. There were 61 members present.

The lists of newly appointed committee members were read off at the business session. The membership committee, headed by A. Kroegar, Monsanto Chemical Co., includes R. R. James, Goodyear Tire & Rubber Co.; L. F. MacDonald, B. F. Goodrich Co.; M. L. Pine, Firestone Tire & Rubber Co.; and P. Ritter, United States Rubber Co. The golf committee, consisting of A. L. Pickard, Braun Corp., and E. Brooks, California Golf Products, announced a tournament for January 29. A. D. McPherson will have charge of current events, and publicity committee work is to be handled by the group secretary-treasurer, M. Montgomery of Martin, Hoyt & Milne, Inc. Employment committee affairs are in the hands of A. L. Pickard. For the program committee, Mr. Drew stated that the next three meetings had been arranged. In February the Goodyear Company would have the entire program, and in March the program would be presented by the National Tire Dealers Association.

Dr. Lloyd Eller, principal speaker for the evening and one-time director of the Balasore Technical School in Calcutta, told of his adventures in India. He discussed his early work with formal education and then his more important work in presenting American ideas of sanitation to the Indian people. Through the improvement of drinking water supplies immense strides were made against the dreaded disease, cholera. An interesting sidelight was that, owing to the sacredness of the cow in India, the natives would not touch water pumped with leather cups. The problem was solved by using washers made of rubber, a material acceptable to the Hindu faith. Dr. Eller illustrated his talk with motion pictures.

A short talk on "Recording and Controlling Instruments" was given by Mr. Pickard. In his talk he illustrated the different types of instruments available for control work in the rubber industry and pointed out the necessity of their use. An informal report on poinsettias as a source of latex was made by K. Fleshman.

The raffle prize, a beautiful electric clock donated by W. D. Schwartz, of the L. H. Butcher Co., was won by Mr. Tyler of the Waynway Rubber Co. A. McMurray won the poor prize, a leather traveling bag donated by S. E. Brennan, H. Muehlstein & Co. The table favors, bottles of gin, for each member, were donated by L. Crank, Pacific Distillers, through arrangements made by T. Kirk Hill. The next meeting will be held in the Mayfair Hotel, on Tuesday, February 1.

### Chicago Group

THE Chicago Group, Rubber Division, A. C. S., has made arrangements to hold its next meeting on Friday evening, February 18, in the College Inn of the Sherman Hotel, Chicago, Ill. The evening's program, which will be under the direction of Dr. C. E. Frick, is to be one of outstanding merit. Entertainment, which will take place following the dinner, will be in the form of a floor show and music by a well-known orchestra.

For the technical portion of the program, the Midwest Rubber Reclaiming Co., East St. Louis, Ill., will present the world premiere of the motion picture, "Rubber Reborn", a professional production photographed by skilled cameramen. William Welch, president of Midwest, will narrate during the presentation. It is said that all the details of this hitherto secret process will be made completely visible. Many outstanding members of the rubber and chemical industries have been invited to attend this unusual meeting. Reservations may be made through Ben W. Lewis, Secretary, c/o Wishnick-Tumpeer, Inc., Tribune Tower, 435 N. Michigan Ave., Chicago, Ill.

### Boston Group

THE Boston Group, Rubber Division, A. C. S., will hold its first 1938 meeting on February 4 at the Fox & Hounds Club, 448 Beacon St., Boston, Mass. The program will be featured by three short talks covering different phases of the rubber industry. The program follows: Roland D. Earle, of Angier & Earle, Inc., will discuss "New Developments in the Manufacture of Rubber Cements;" Jesse H. Mason, of Haartz-Mason-Grower Co., will speak on "Rubber Proofing;" and Robert C. Kelley, of the Converse Rubber Co., will present as his subject "As a Buyer Looks at the Rubber Market."

During 1938 the group will eliminate the theoretical and highly technical type of discussion. This course is to be followed as a result of many requests for papers and talks that could be understood by all group members, both chemists and non-technical men. The executive committee has announced that in addition to the February meeting the group will hold meetings on Friday, May 6, and Friday, November 4. The summer outing will be held some time between August 15 and September 30.

### S. C. I. Meetings

THE annual meeting of all sections of the Society of Chemical Industry will be held in Ottawa, Canada, June 20-22, 1938. A full program of events extending over the period June 17 to July 1 has been arranged for the visitors from abroad. The American Section will entertain members of the parent society at Niagara Falls, N. Y., on June 25, 26, and 27.

From London comes the announcement that Dr. Leo H. Baekeland has been elected to receive the Messel Medal for 1938, and it will be presented to him at the annual meeting in Ottawa, June 20. This medal, awarded by the S. C. I. every two years for outstanding achievement in science, was founded in 1922 in honor of Rudolph Messel, benefactor, one of the original members and twice president of the society.

The American Section of the society will meet February 11 at 8:00 p.m. at The Chemists' Club, 52 E. 41st St., New York, N. Y., jointly with the American Chemical Society. James G. Vail will preside at the meeting, at which Wm. M. Phillips, engineer of finishes, General Motors Corp., will give a projectoscope talk entitled "Graphic Presentation of Electroplating Operations". A dinner will be held at the club, at 6:15 p.m.

## Polar Properties of Natural and Synthetic Rubber[1]

THE quantity of heat liberated by a rubber material, when it is suddenly immersed in the vapors of an organic solvent, is affected by the polarity of the rubber material. The measurement of this quantity therefore offers a means of determining the polar properties of various rubber films and, thus, of their oil resistance. An increase in polarity results in a decrease in the amount of heat liberated.

Test films were prepared by various methods from crude, purified, masticated, vulcanized, and chlorinated natural rubber, gutta percha, and synthetic rubbers. The vapors of benzene were condensed on these films. The quantities of heat liberated from the various films by absorption of benzene vapor are:

| Test Film | Heat Liberated, Cal./g. |
|---|---|
| Natural crude rubber | 592.5 |
| Sol rubber | 420.0 |
| Gutta percha | 329.2 |
| Masticated rubber | 325.3 |
| Purified rubber | 193.4 |
| Hot-cured rubber | 144.0 |
| Chlorinated rubber | 142.8 |
| Cold-cured rubber | 110.9 |
| Irradiated (by ultra-violet rays) purified rubber | 98.7 |
| Alkali-reclaimed rubber | 93.9 |
| Neoprene | 60.5 |
| Synthetic rubber No. 1969 | 48.4 |
| "Thiokol" A | 43.3 |

Thus, natural rubber is shown to be the least polar material of those tested; purification, vulcanization, mastication, irradiation by ultra-violet rays, and chlorination increase the polarity of rubber. Synthetic films show small thermal effects because of the high polar properties and the compactness of structure of the films.

[1] Abstracted from "The Oil Resistance of Rubber" by Y. Tanaka, S. Kambara, and K. Hirakawa, *Rubber Chem. Tech.*, Oct., 1937, pp. 708-15.

## A.S.T.M. Regional Meeting

The 1938 Regional Meeting of the American Society for Testing Materials will be held at the Seneca Hotel, in Rochester, N. Y., March 9, and throughout the week beginning March 7 there will be in progress the annual spring group meetings of society committees, including D-11 on Rubber Products. Committee D-9 on Electrical Insulating Materials will meet in Philadelphia, Pa., on February 28 and March 1; while the meeting of Committee D-13 on Textile Materials is scheduled for March 9 to 11 in Washington, D. C.

## X-Ray Diffraction Patterns of Rubber[1]

RP1039 in the October number of the *Journal of Research* describes recent work by Prof. George L. Clark and Enno Wolthuis, of the University of Illinois, in cooperation with W. Harold Smith, of the Bureau's Chemistry Division, on the X-ray diffraction patterns of sol, gel, and total rubber when stretched and when crystallized by freezing and from solutions.

Ordinary unstretched rubber, when examined by X-rays, produces a blurred ring, the halo of which is typical of the amorphous or liquid state. When stretched, however, rubber yields an X-ray diffraction pattern characteristic of a fibrous crystalline material.

If massive rubber is cooled to a low temperature, but not stretched, a hard opaque material is formed, which also yields a crystalline X-ray diffraction pattern like that produced when rubber is stretched. The same pattern is also obtained from crystals of rubber which separate from ethereal solutions at low temperatures.

In the present investigation rubber has been separated into two parts, "sol" and "gel," by a method which avoids oxidation and structural changes. The sol composes about 75%, the gel about 25%, of the total rubber. When stretched, the sol rubber shows no evidence of crystallinity. The gel rubber, however, produces a crystal pattern which is well defined. The larger of the two fractions flows more readily under stress, or is more mobile than the smaller.

In the smaller fraction, unstretched, a large interplanar spacing was found, which is absent in the larger one. Its significance is not yet understood.

Because of the unique physical properties of rubber, its structure has been studied by many other investigators who have used X-rays. Each has contributed refinements of technic or new mathematical deductions. As a result, there has been a continued increase of the volume assigned to the unit cell of rubber. Within a year there has been a contribution by Lotmar and Meyer, in Switzerland, who have assigned to crystalline rubber a monoclinic structure. Barnes, in Canada, has checked the cell dimensions, and the results of the present investigation are also in excellent agreement with Lotmar and Meyer. Consequently the dimensions of the unit cell of rubber now appear to be fixed, and the identity of crystals grown by stretching, by cooling massive rubber, and by crystallization from cold solutions, has been established.

[1] *Tech. News Bull.*, Nat'l Bur. Standards, Oct., 1937, p. 104.

## Industrial Skin Ailments[1]

THERE is little doubt that the vast majority of dermatoses occurring in industry are due to substances which act directly on the skin. In most of these cases causal relation between an irritant and its effect is fairly easy to establish. In general, removal of the offending substance results in prompt amelioration of the condition.

Those systemic poisons which produce skin lesions act, as a rule, very differently from the local irritants. Usually the systemic poisons require many weeks or months before skin manifestations appear. Frequently there is a cumulative effect. Absorption of poisonous dusts, gases, or vapors through the lungs is the usual portal of entry.

Below are enumerated some of the more common systemic poisons which may cause skin lesions. A few are listed which, although not very common, are of particular interest.

TABLE I

Systemic Poisons Which May Cause Skin Changes*

| | | |
|---|---|---|
| | 1. Heavy Metals | |
| Antimony | Chromium? | Silver |
| Arsenic | Lead | Tellurium |
| Bismuth | Mercury | Thallium |
| | 2. Benzene Derivative Group | |
| Aniline and amino compounds of benzol | | Ethyl benzene |
| | | Nitrobenzol group |
| Benzol and homologues | | Phenol group |
| | 3. Miscellaneous | |
| Bromine? | | Chlorine |
| Carbon disulphide | | Tetrachlorethane |
| | Selenium | |

TABLE II

Systemic Poisons Which May Cause:

| | | |
|---|---|---|
| | 1. Purpura | |
| Aniline and amino compounds | | Ethyl benzene |
| Benzol and homologues | | Nitrobenzol group |
| Carbon disulphide | | |
| | 2. Pigmentation of the Skin | |
| Antimony | Bromine | Copper |
| Arsenic | | Silver |
| | 3. Changes in Mucous Membrane of Mouth | |
| Antimony | Bismuth | Mercury |
| Arsenic | Bromine | Silver |
| | Lead | |
| | 4. Loss of Hair | |
| Barium | Thallium | Selenium |

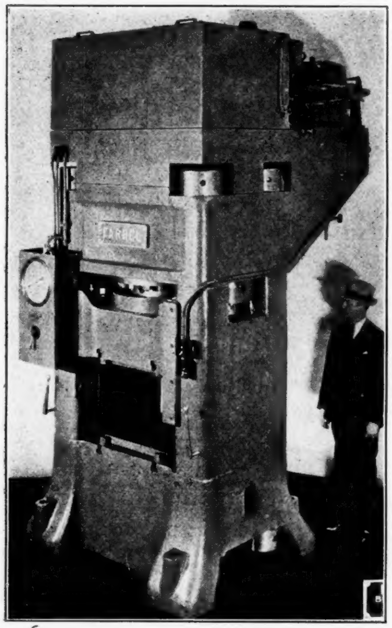
* Those followed by a question mark are so designated because it has not been fully established that they produce skin changes through systemic action.

[1] Abstracted from "Skin Manifestations of Systemic Poisons" by L. J. Goldwater, M.D., *Ind. Bull.*, Sept., 1937, p. 350.

## Caulking Compound

A double-duty caulking compound, made of rubber, linseed oil, and asbestos, can be applied with either gun or tool. The rubber allows for expansion and contraction; while the linseed oil affords a protective film against moisture. Gun application is recommended for narrow openings around doors, windows, etc. For larger openings the caulking compound is applied with a putty knife or similar device. The compound sets quickly and can be painted one day after application.

# New Machines and Appliances




Farrel Cold Molding Press

## Down-Acting Press for Brake Blocks

A HYDRAULIC press has been designed for cold molding of automotive brake blocks where pressures vary with the construction and material used. The bottom platen is stationary, and the top platen is actuated downward with a press capacity of 10 to 500 tons by means of one down-acting 21-inch diameter ram and two 6⅛-inch double-acting cylinders mounted in the top crosshead. The pressure valve control permits setting so as to select any one of ten predetermined pressures, and further adjustment of the valves can be made to provide any other desired pressure within the range by combination of the three motivating rams. The two 6⅛-inch rams are double acting and serve to raise the top platen as well as aid in obtaining the downward pressure.

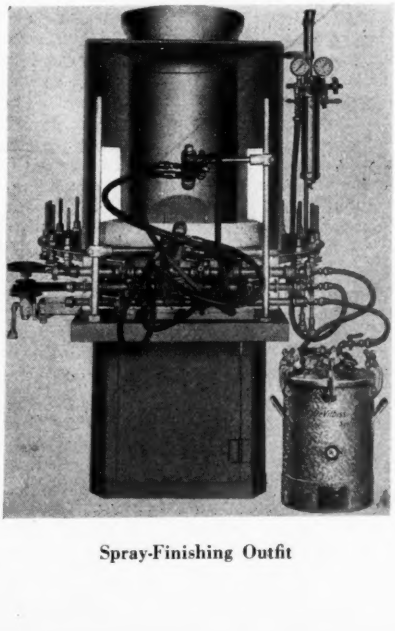
As required for brake-block molding, the "dwell" of the selected pressure on the work may be automatically timed over a range of two to 40 seconds. A working cycle of the press is effected by push button control which causes the moving crosshead to descend, engage the work at the predetermined pressure for the predetermined period of time, and then return to the top position.

The press is of the self-contained, individually powered type, with a 23.8 gallon-per-minute radial piston pump mounted, with the oil tank, on the top crosshead. The press has a maximum opening of 24 inches, a maximum stroke of 24 inches, and a 38- by 31-inch platen area. While originally designed for quick cold molding, the press can be altered to provide steam chambers in the platens for vulcanization of rubber products. Farrel-Birmingham Co., Inc., Ansonia, Conn.

## Automatic Rotary Spraying Machine

AN IMPROVED rotary spray-finishing machine designed primarily for lacquer or enamel coating of small or medium sized articles comprises a power driven turntable carrying the objects positioned on spindles into and through a spraying chamber so that as many as four spray guns can be played on the article at the same time. While the turntable passes through the chamber, a grooved pulley at the bottom of each spindle contacts a V-belt so as to revolve the spindle and article while in position for spraying. The spray guns are operated by an adjustable cam only during the effective period. The type YB machine can handle a production up to 3,600 pieces per hour if the articles are small so as to use the maximum number of spindles on the turntable.

The equipment includes spindles, automatic spray gun, automatic control valve, hose connections, and other complete accessories. The spray machine, available in three sizes for light, medium, or heavy duty, is equipped with a speed reduction unit and may be operated at several different speeds to fit the requirements. The turntable is driven by a ¼ h.p. motor, the speed of which is determined by the work to be done. Turntables up to 60 inches in diameter will accommodate as many as 50 spindles, the number depending on the size of the pieces to be sprayed. Each machine is equipped with an exhaust chamber, and if desired, a drying oven can be furnished. The production speed of the machine is limited only by the speed of the operator in loading and unloading the pieces to be sprayed.



Spray-Finishing Outfit

All shafts and spindles operate on roller and ball bearings respectively, tightly housed to prevent entrance of the finishing liquid. While the machine was designed for other purposes, it is claimed to be suitable for spraying rubber products and adaptable to the spraying of latex provided some special features are incorporated and exposed parts are made of specially treated metal as in the case of spray guns, tanks, etc., to withstand the action of chemicals in latex. The DeVilbiss Co.

*Ward Plastic & Rubber Co.*

Press Equipped with Strip Heaters—Arrows Show Location of Heating Units

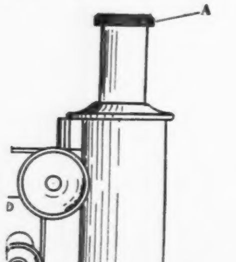
## Strip Heaters for Molding Presses

ELECTRICAL strip heating units, installed in the platens of plastic-molding presses, provide for precision thermostatic control with uniform temperature throughout the platens. By means of these strips and through separate control of each platen it is possible to maintain a higher temperature

in the larger radiating area of the top platen than in the bottom platen. Approximately eight kilowatts of heating units are connected in each press. The parallel strip units are arranged so as to maintain constant heat in the platen areas where it is needed. The advantages of strip heating units over steam, as reported by the Ward Plastic & Rubber Co., Ferndale, Mich., where installation has been made, are lower initial cost and better heat control which reduces the quantity of scrap produced because of over or under heating. General Electric Co.

## Microscope Polarizer-Analyzer

MARKS POLARIZER-ANALYZER, which is used for a variety of purposes in micro-analysis, consists of two separate parts, a polarizer and an analyzer. The polarizer comprises a ⅜-inch diameter brass fitting in which a 5 mm. aperture Marks Polarizing Biplate is mounted. This fitting is set in a bakelite slab which rests upon the stage of the microscope; the polarizer mounting is positioned within the aperture of the stage. The microscope slide sets in the usual position on top of the bakelite table. The analyzer also contains a Marks Polarizing Biplate and may be placed in either of two different positions, each requiring a somewhat different fitting. One type of analyzer is placed in a free position over the eyepiece; while the other type is screwed into the bottom of the draw tube. Slightly better resolution is usually obtained with the latter type. The Marks Polarizing Biplate, used in both analyzer and polarizer, consists of two thin disks of glass between which is placed a polarizing crystal.

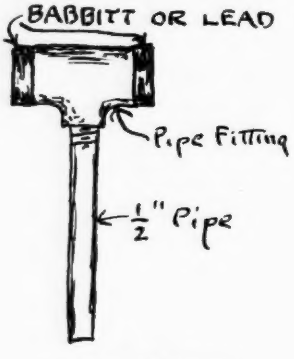



Marks Polarizer-Analyzer

**A—Analyzer over the Eyepiece; BT—Bakelite Table Resting on Stage; P—Polarizer Suspended from Bakelite Table; S—Slide**

The image seen is clear and well defined, and all colors appear with perfection. Practically complete extinction of light is obtainable, resulting in a dark background. A few examples of its uses will serve to illustrate its application. (1) Separation of crystalline substances into isotropic and anisotropic (double-refracting) substances. An isotropic substance, when placed between crossed polarizer and analyzer, will not light up, but an anisotropic substance will light up brilliantly and exhibit beautiful coloration. (2) Study of isotropic transparent materials such as glass, plastics, and Cellophane to determine whether or not internal strains exist. If internal strains exist, coloration and interference patterns occur, and if not, the field remains dark. (3) Determination of thickness of anisotropic materials in form of thin films by the color exhibited. (4) In the examination of colloidal solutions, when the colloidal material is itself dichroic, the analyzer should be used alone, without the polarizer. A dichroic colloidal material upon being alined by flowing or by being placed in an electric field exhibits the dichroic effect which can be studied under the microscope.

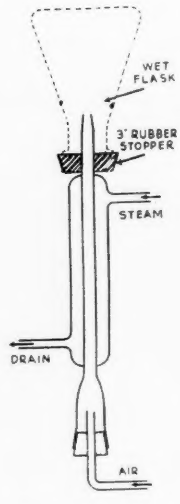
In the examination of the surface of opaque materials vertically, the light thrown upon the surface is polarized by inserting over the light source a special polarizing plate of correct size. The analyzer is used as usual. This results in the elimination of surface glare and highlights, and improves the visibility of detail and color. Laboratory Equipment Co.




Soft-Faced Hammer

## Lead Hammer

A SOFT hammer for striking machine parts that must not be scratched or battered can be made from a babbitt- or lead-filled standard "Tee" pipe fitting and a half-inch pipe, the former serving as the head and the latter as the handle. Paper is wrapped around the "Tee" rim to form the face of the hammer and to keep the metal from spilling as the molten metal is poured. Scrap metal may be used as a partial filler, if desired. The size of the hammer head is limited only by the size of pipe "Tee" available.




Glassware Drier

## Drier for Chemical Apparatus[1]

A SIMPLE apparatus for drying laboratory glassware provides for a stream of warm air blown directly into the equipment to be dried. Constructed of materials available in any laboratory, the drier consists of an ordinary glass condenser, the inner tube of which is stuffed lightly with steel or copper wool. Steam from an ordinary steam line is passed through the outer jacket, heating the air passing through the inner tube. The inner tube is connected to a compressed air line, and a large rubber stopper on the upper end of the condenser serves as a support for the glassware to be dried. To avoid blowing the equipment from the rubber stopper, the air pressure used must not be too great. The drying rate is appreciably higher than when air is used directly without heating. This drier does not have the fire hazard associated with electrically operated heaters.

[1] Abstracted from *Synthetic Organic Chemicals*, Dec., 1937, p. 4, published by Eastman Kodak Co., Rochester, N. Y.

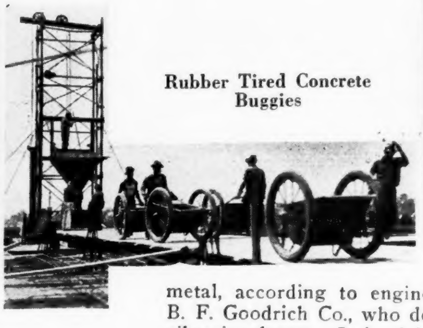
## Protection from Snow Glare

A NEW product, Snopake, recently announced, is said to reduce the excessive glare experienced during the winter in buildings adjacent to open fields where large expanses of snow are present. The product is a pale-green adhesive liquid that can either be brushed or sprayed on the windows. The manufacturer reports it admits over 90% of the light, yet reduces it to mellow softly-diffused illumination. Snopake is applied to the inside or outside of the window and remains on the glass until removed with hot water and stiff bristle brush.

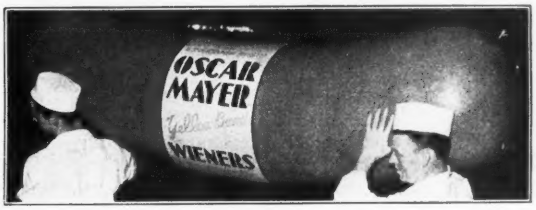
# New Goods and Specialties

*John G. Roberts*

Improved Clothes-Pin



Rubber Tired Concrete Buggies




Advertising Balloon

## Rubber Clothes-Pin

THIS new clothes-pin made of rubber eliminates pulled threads from garments and will not splinter or split as do the old wooden ones, thus rendering longer service with less possibility of injury to the hands. This rubber device is said to have a very strong grip, and its maker claims it will hold a blanket on the line in the face of a gale, thus reducing the hazard of drying clothes becoming soiled because of failure of the pin. Durable and nonporous, it is also washable. The cost is about the same as for the old-fashioned wooden pin. Fiber Plastic Corp.

## Rubber for Marine Use

AWARE of the beneficial results obtained through the use of rubber ashore, boat builders are finding an increasing number of new uses for rubber on modern yachts and cruisers. One of the latest developments is the vibro-insulator, an engine mounting which reduces the shaking and pounding caused by the high-powered engines in modern cruisers. Vibration reduction is accomplished by holding the rubber in shear between the engine proper and the mounting. This is made possible by a new process for binding rubber to metal, according to engineers of The B. F. Goodrich Co., who developed the vibro-insulators. It is claimed that vibrations are absorbed more efficiently with this method than when rubber is used in compression.

Another important contribution to vibration reduction is the use of soft rubber cutless bearings for propeller shafts. As rubber is almost frictionless when wet, these bearings permit free-spinning shafts. Also, the rubber provides protection against abrasives; sand and grit sink into the soft surface of the rubber, and the shaft rolls them into grooves where they are washed away.

Through the development of new rubber compounds, resistant to the corrosive action of salt spray, a number of other products have been designed for marine use. Among them are rubber batteries, floor tiling, exhaust lines, steering wheel grips, waterproof awnings, and electric cable jackets.

## Rubber Tires for Cement Buggies

BUGGIES for carrying concrete and equipped with rubber tires are now being used by the Austin Co. on construction work. These buggies not only handle easier with less noise, but the wheels can be grabbed without risk of accident when the worker is guiding the buggy into position for the pour. The tires employed for this purpose are size 21 by 4.40.

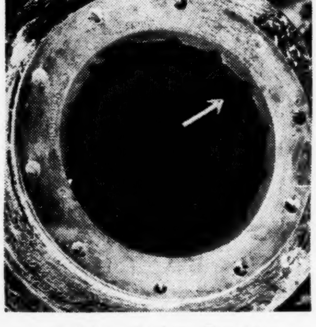
## Rubber Wiener

A WIENER six feet long and two feet in diameter is made of rubberized fabric and painted with special wiener-colored balloon paint. The sausage, when inflated with air, actually looks edible. Wieners such as this are used for advertising purposes in a Chicago establishment which serves its own well-known brand of frankfurters. Goodyear Tire & Rubber Co., Inc.

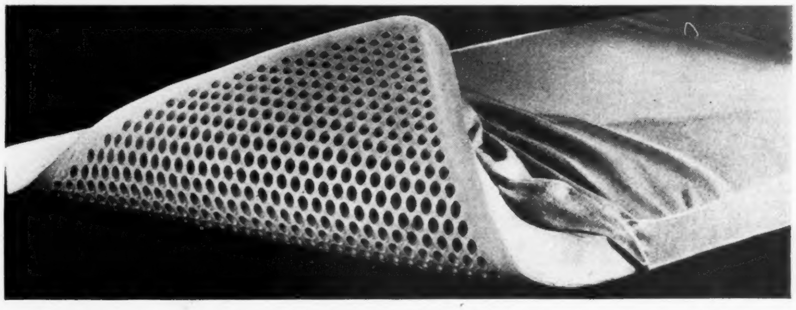
## Latex Mattress

A NEW type of mattress, made of latex and known as the Red Ball Sleep-Cushion, was recently announced by the Mishawaka Rubber & Woolen Mfg. Co., Mishawaka, Ind. The latex is whipped to a foam and vulcanized into a single piece. This material then consists of millions of intercommunicating air cells forming a cushion of air which changes every time the cushion is compressed by the body. The porosity and resiliency of this material is achieved by the tiny cells; none of which is air locked. When compressed, they release their air and then fill again as the pressure is changed or lifted; thus the cushion is said to breathe. The holes extend clear through for flexibility and positive air circulation. A cloth cover fits over the cushion. By volume this mattress is 85% air and 15% rubber and weighs about half as much as an ordinary mattress.

Many advantages are claimed for this product. No padding, springs, wires, hair, tufts, or buttons are required, and



Rubber Cutless Bearing



Construction of Red Ball Sleep-Cushion, with Cloth Cover Removed

a smooth surface results. As the material used is softer than the body, it shapes itself to every contour and supports in direct proportion to the weight resting on it. Besides the Sleep-Cushion gives restful comfort, is light weight for moving, sanitary, and of great durability.

## Moineau Pump Uses "Thiokol"

THE Moineau pump, for delivering grit-containing liquids, uses "Thiokol" for grit and abrasive seals and for the construction of the stator, which has an internal form of a double threaded helix. The metal rotor, on the other hand, has the shape of a single threaded helix, effecting a positive end-wise displacement of the liquid. The selection of "Thiokol" for use in the pump design was due to its resistance to oils, solvents, acids, and wear caused by abrasives. With this pump it is possible to deliver a 30% mixture of sand and gravel as readily as water. The pump, invented in France, has recently been introduced in this country by Robbins & Myers, Inc.

## Golf Practice Outfit

KITT'S PRACTICE KIT consists of a green rubber tee with a picture of a golf ball attached horizontally at the crown and 50 cardboard golf ball targets. These targets are inserted vertically into a slot located in the center of the rubber tee to give, along with the horizontal picture, a three-dimensional effect. The set, designed for assisting the golfer to improve his stroke, may be used either indoors or outdoors. A grease marking crayon rubbed on the face of the club head will indicate on the target where it is being struck. Kitt's Golf Practice Kit.

## Extensible Telephone Cord

EXTENSICORD, a new hand-set cord for telephones, stretches easily in a smooth, untwisted line while the user assumes a comfortable talking position. When the hand unit is replaced, the cord contracts to its normal form, less than half of its fully extended length. The insulated conductors are braided to each other around a braid-covered elastic strand as a central core. This simple, but unique construction provides for accordion action without any tendency to kink or loop. Extensicord is available having a contracted overall length of 28 inches, spade terminals, and brown braided covering. American Automatic Electric Sales Co.

Telephone with Extensicord

## Auto Trailer Coupler

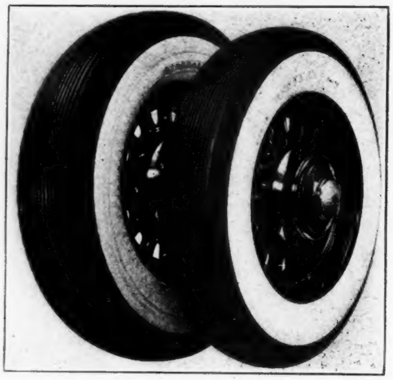
A CUSHIONED coupling arrangement provides a novel means of attaching a trailer to the rear deck of the power car. It consists of a 20-by 4-inch pneumatic tire mounted on a special wheel and fastened horizontally by external circular clamps to the rear deck of a coupe or roadster. The trailer spindle, which hooks the trailer to the car, is inserted in the hub of this wheel. The air-filled tire absorbs all power car vibrations and also all thrusts or shocks from the trailer. Aerocar Co. of Detroit.

## Dual 8 Added to General Tire Line

FOR use on the Ford, Chevrolet and Plymouth class of automobiles, General Tire & Rubber Co., Akron, has just announced the new Dual 8 tire with the "squeegee tread" and somewhat lighter and smaller than its older brother, the Dual 10.

According to L. A. McQueen, General Tire sales manager, the Dual 8 is built from special long-fiber fabric stock and has also incorporated the tread of narrow vanes of rubber which form into a serpentine shape, when baking pressure is applied, and wipe the surface substantially dry, enabling the adjacent vanes of rubber to cling to a pavement practically free from moisture. It is claimed that this tread enables cars to be stopped, on wet surfaces, in a shorter distance than cars on ordinary tires can be stopped on dry pavements. The new tire has a distinctive sidewall design and is now being produced in both white sidewall and black sidewall types.

It is reported possible to market the new Dual 8 tire at a cost within a dollar per tire of the ordinary equipment tires.



General Tires: *Left*—Dual 10; *Right*—New Dual 8

## Rubber Plating Accessories

BASED on surveys which indicated that rubber plating accessories are rejected because of an inability to withstand wear and tear, rather than chemical corrosion, the Udylite Co. recently introduced a complete line of rubber gloves, aprons, and boots, pretested not only for high acid resistance, but for unusual mechanical strain and wear.

Udylite rubber gloves are furnished in two types: Red Latex, described as an ideal inexpensive glove, and the Special White acid resistant glove.

The line of rubber boots is offered in a three price range. The No. 1 quality boot is an all-white boot with special acid resistant qualities and is furnished in knee-length only. The No. 2 quality boot is a red boot with white sole, in knee length only. The No. 3 quality boot is a black boot with red sole; it is furnished in knee, three quarter, and full hip lengths.

Udylite rubber aprons are full size (32 inches wide by 45 inches long, excepting straps) made of one ply highly acid resistant durable rubber. Corners are reenforced with eyelets. All edges are turned in and reenforced with extra ply rubber. The heavy-weight apron runs 3 pounds minimum per apron; while the light-weight apron varies between 2 pounds minimum and 2½ pounds maximum per apron.

Golf Tee

Aero Coupler

# Rubber Industry in America

## EASTERN AND SOUTHERN

THE recession continues very much in evidence, although an occasional favorable report brings a glimmer of light to the picture. Thus automobile production shows some improvement; while steel mill activity last month advanced, for the first time since mid-September. To counteract the layoffs in industry a prop to purchasing power arrived on February 1, when payments start on unemployment insurance in 21 states.

Probably the most serious obstacle against a speedy resumption of business recovery is the existence of over-large inventories of materials and finished goods in the warehouses of thousands of factories and dealers throughout the country. Probably the primary cause of the building up of these too-heavy inventories was the series of rapid advances in wage rates that took place in 1936 and the first half of 1937. These occurred throughout industry, and in order to make them and still cover costs producers lifted prices. Fortunately, however, these over-large inventories are now being worked down; which fact constitutes the most hopeful aspect of the present business situation.

In 1937 retail trade was estimated at 6% above the 1936 dollar volume, with the physical volume somewhat under the 1936 figure because prices averaged higher than the dollar gain. January began the period when retailers go after business in earnest. The desire to reduce inventories has already led to intensive promotions, it is noted, but price competition was moderated by the view that customers are more liberal spenders in the holiday season.

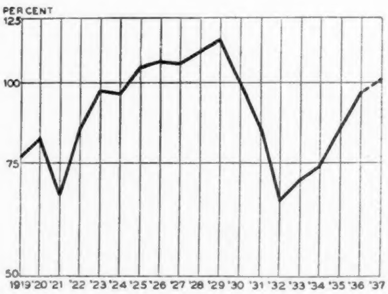
Although it is reported January consumption of crude rubber should show a gain over December because of increased activity in the automotive industry calling for more tires, actual rubber is weighing somewhat on the market because of lack of factory buying. Rubber brokers are said to be loaded up with the commodity almost to the limit and cannot take on any more until manufacturers call for delivery of rubber for which they have contracted. U. S. stocks of rubber are too high for the current rate of consumption although they would be held normal on the bases of demand before the recession.

**Aluminum Co. of America,** Pittsburgh, Pa., last month reported that it is maintaining a steady program of production of aluminum ingot even though demand for aluminum products is curtailed and there is a dearth of orders from its thousands of customers. In the lean years after 1929 the company followed this general policy, maintaining production greatly in excess of shipments until it had accumulated a total of more than three times the average annual shipments during that period and about one-third more than its entire shipments in the boom year of 1929. This policy resulted then and is resulting now in a steadying influence on employment in the communities where these plants are located.

### Production and Trade in 1937

The Federal Reserve Bank, New York, in a recent monthly review stated that despite recession in numerous lines of business during the last quarter of 1937, the volume of production and trade for the whole year is estimated to have totaled about 5% more than in 1936. Although the increase over the previous year was less than half that which occurred between 1935 and 1936, the recovery from the low level of 1932 was extended to 52%, and the 1937 aggregate volume of business was about equal to that of 1930. Total production and trade in 1937, however, is estimated to have remained 13% less than in 1929 and about 6½% below the average for the years 1925 through 1928, in each of which there was a larger volume of business than in the year just closed, as the accompanying diagram indicates.

The diagram is constructed from this bank's final estimates of the volume of production and trade for the years 1919 to 1936, as derived from data on more than 200 business series, and from the preliminary estimate for 1937 computed from those principal series currently available, which have in the past given reasonably close approximations of the movement of the more comprehensive index. The data used in arriving at the preliminary estimate for 1937 included figures on the production of manufactures and minerals, agricultural production, building construction, and railroad car loadings of merchandise and miscellaneous freight. Actual figures for at least the first 11 months of 1937 were included, and estimates were made for the remaining periods of the year.




*Federal Reserve Bank*

**Index of General Production and Trade in the United States**

**(Preliminary estimate for 1937 based on principal series—ratio scale used to show proportionate changes; 1923-25 average = 100%)**

Manufacturing output rose 4% further in 1937, making a total advance from the 1932 low of 73%, but remained about 8½% less than in 1929 and was also somewhat less than in 1928.

Car loadings of merchandise and miscellaneous freight in 1937, although up 5% from 1936 and 27% from the 1932-33 level, were still 29% below the 1929 total.

**Motor & Equipment Manufacturers Association,** 250 W. 57th St., New York, N. Y., through General Manager A. H. Eichholz, has announced the election by its directorate at a meeting on January 11 of the following officers for the current year: president, Fred G. Wacker, Automotive Maintenance Machinery Co., North Chicago, Ill.; vice president, Herbert L. Sharlock, Bendix Aviation Corp., South Bend, Ind.; secretary, W. P. Ferris, Blackhawk Mfg. Co., Milwaukee, Wis.; treasurer (reelected), Clyde Park Brewster, K-D Mfg. Co., Lancaster, Pa.

**Stark Mill,** Hogansville, Ga., a unit of U. S. Rubber Products, Inc., New York, N. Y., recently completed fifty additional dwellings for its employes. The mill also constructed a warehouse large enough to take care of 10,000 bales of cotton.

**Purchasing Agents Association of New York,** 120 Broadway, New York, N. Y., on February 15 will hold a conference, at the Hotel Pennsylvania, New York, the theme of which will be: "How right is the salesman; how right is the purchasing agent?" Speaking for the former will be W. H. Oliver, district sales manager, Republic Steel Co.; and for the latter, John K. Conant, purchasing agent of the General Printing Ink Corp. The discussion will be followed by a reception and dinner.

## Greetings, Calendars, and Souvenirs

The staff of INDIA RUBBER WORLD gratefully acknowledges the following holiday mementos.

From Godfrey L. Cabot, Inc., Boston, Mass., came handsome copies of the Rand McNally world atlas.

An individual desk memo pad was forwarded by The Vultex Chemical Co., Cambridge, Mass., through Dr. George D. Kratz.

Interesting pocket memorandum books were sent by John Royle & Sons, Paterson, N. J., and General Atlas Carbon Co., 60 Wall St., New York, N. Y., which also sent, through Vice President Carl J. Wright, an instant name finder (telephone index).

A tire ash tray came from H. S. Hoover on behalf of The General Tire & Rubber Co., Akron, O.

Rare Metal Products Co., Belleville, N. J., supplied a unique and practical memorandum wallet.

Attractive greeting cards came from Bausch & Lomb Optical Co., Rochester, N. Y.; The Cleveland Liner & Mfg. Co., Cleveland, O.; Collord, Inc., 7049 Lydon Ave., Detroit, Mich.; Davol Rubber Co., Providence, R. I.; Carl J. Wright, of General Atlas Carbon Co., and H. E. Howe, of *Industrial Engineering and Chemistry,* Washington, D. C.

Useful calendars were forwarded by Advanx Tyre & Rubber Co., Pty. Ltd., Sydney, N.S.W., Australia; American Zinc Sales Co., Columbus, O.; Imperial Paper & Color Corp., Glens Falls, N. Y.; Link-Belt Co., 2045 W. Hunting Pk. Ave., Philadelphia, Pa.; National Rubber Machinery Co., Akron; Northwestern Rubber Co., Litherland, Liverpool, England; The Oak Rubber Co., Ravenna, O.; Beth Pitt, "The Lighted Balloon Girl;" and C. K. Williams & Co., Easton, Pa.

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**Herman Muehlstein,** of H. Muehlstein & Co., Inc., 122 E. 42nd St., New York, N. Y., has been awarded a parchment scroll by John W. Davis, chairman of the United Hospital Campaign, in appreciation of his services during the recent appeal to aid the 92 voluntary hospitals of New York and the Visiting Nurse Association of Brooklyn. The scroll is signed by Mr. Davis; David H. McAlpin Pyle, president of the United Hospital Fund; and George A. Wilson, secretary of the fund. Mr. Muehlstein acted as chairman of the rubber industries division of the industry section.

**Père Arthème Dutilly,** missionary-botanist who recently returned from the Canadian Arctic to Washington, D. C., reported the Eskimo people are changing fast; even in the matter of clothing are they rapidly becoming "westernized." The older generation adheres to the traditional fur parka, but the younger element must have sweaters and rubber-soled sneakers, at least for summer wear.

## Naugatuck Aromatics

Naugatuck Chemical, Division of United States Rubber Products, Inc., 1790 Broadway, New York, N. Y., through General Sales Manager John P. Coe has announced the opening of a new office at 153 Waverly Pl., New York, to handle the firm's business in aromatics. Although part of Naugatuck Chemical, the new branch will operate as Naugatuck Aromatics, Division of U. S. Rubber Products. At the new location, to which all correspondence on aromatics should be addressed, will be maintained sales headquarters for the organization's aromatics, the perfume laboratory, and a complete stock of essential oils, absolutes, and aromatic chemicals. Tonnage shipments, however, will continue from the factory at Naugatuck, Conn.

This new division of the company combines for the United States the entire facilities in aromatic chemicals, essential oils, and perfume specialties of Naugatuck Chemical, Bruno Court, Compagnie Africaine Des Plantes a Parfum, and Louis Bornand. In charge of the new office will be M. G. Couderchet, recently of Bruno Court, who will be assisted by Allan L. Ritch and Frank H. Sloan, sales representatives, and Georges C. Coquel, perfumer. Present Naugatuck representatives outside New York will continue with the new business: Harold J. Edmon, 440 W. Washington St., Chicago, Ill., and Charles J. Horney Co., 1313 N. Vermont Ave., Los Angeles, Calif.

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**Foster Dee Snell,** head of Foster D. Snell, Inc., firm of chemists and engineers, 305 Washington St., Brooklyn, N. Y., addressed the Baltimore Section of the American Chemical Society on January 25 on "Some Factors in Detergency." In his talk Dr. Snell outlined the four known factors and presented evidence to indicate that only those factors control the efficiency of a detergent. This was then applied to many types to illustrate variation in the relative importance of different factors in the cases of toilet soaps, laundry detergents, scrub soaps, wetting out agents, sulphated alcohols, etc.

**Bibb Mfg. Co.,** cotton textiles, Macon, Ga., last month transferred L. A. Graybill to the Columbus, Ga. mill, where he will be in charge of the quality and production of the tire fabric division, particularly the concern's new HR cord, recently put on the market.

**Rolle Rubber Co.,** 296 Broadway, New York, N. Y., in business 40 years as wholesale distributer and jobber of rubber bands, mats, matting, rubber sheeting and tubing, and sponge rubber, on January 1, 1938, changed its name to Kay Rubber Co. The firm has a branch at 434 S. Dearborn St., Chicago, Ill.

## Westinghouse Research at Mellon Institute

Dr. Edward R. Weidlein, director of Mellon Institute, Pittsburgh, Pa., has announced the establishment of an industrial fellowship by the Westinghouse Electric & Mfg. Co. for the study of problems in the field of dielectrics and electrical insulation. Dr. Robert N. Wenzel, a member of the Mellon Institute research staff since 1927, has been appointed fellow in charge of this project. He is a graduate of the chemical engineering department of Stanford University and has had experience in industrial research and has been engaged in physico-chemical studies at Mellon Institute.

The dielectrics fellowship has as its general objective the development of improved insulating materials and processes for application to equipment of Westinghouse manufacture, and it brings the facilities of Mellon Institute into cooperation with those of the Westinghouse Research Laboratories at East Pittsburgh in insulation research.

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**H. J. Smith,** 277 Broadway, New York, N. Y., has announced that he is no longer acting as export representative of the National Rubber Machinery Co., Akron, O., as the Continental Machinery Co., 277 Broadway, and his own personal connections require his entire time.

**General Electric Co.,** Schenectady, N. Y., this year will celebrate its sixtieth anniversary. The initial event in honor of the occasion was a nationwide radio broadcast on January 3 by Charles E. Wilson, executive vice president of the company, who pointed out that on October 15, 1878, the Edison Electric Lighting Co. was incorporated, the first of the companies that were eventually merged to form the present G-E organization. During his address he also paid tribute to Thomas A. Edison, Charles P. Steinmetz, Frank Sprague, and other electrical pioneers upon whom the entire industry is founded.

**The Shook & Fletcher Supply Co.,** Birmingham, Ala., which for many years specialized in equipment to the power, chemical, steel, mining, and allied industries, recently announced the addition of a full line of industrial rubber products as manufactured by the Republic Rubber Division, Lee Tire & Rubber Corp., Youngstown, O., to its list of other well known lines. A complete stock of belting, hose, and packing will be carried in the firm's new warehouse at Avenue "A" and 24th St. under the supervision and managership of Fred V. Bailey. Mr. Bailey will bring to Shook & Fletcher Supply Co. an engineer's experience in rubber of long standing, which will round out a complete service to general industry which this firm will be able to render.

## Neoprene Production Interrupted

Reconstruction has been started by E. I. du Pont de Nemours & Co., Inc., Wilmington, Del., to enable resumption, at the earliest possible time, of Neoprene production, which was interrupted on Sunday, January 23, by an explosion at the Deepwater, N. J., plant, of a tank of divinylacetylene, which is a by-product of the Neoprene process. It is estimated that approximately three months will be required to repair the damage to the buildings and equipment necessary to the production of Neoprene. Owing to a substantial volume of orders on hand last November when an addition to the plant was completed, it had been impossible to build an inventory of more than two weeks' supply. Many rubber manufacturers will no doubt be handicapped by this shortage of Neoprene during the reconstruction period.

With the full crew at work, most of the men escaped uninjured, but the unfortunate accident resulted in the death of three men. The major damage occurred in the acetylene polymerization building, and the adjoining building in which chloroprene is converted to Neoprene was damaged only slightly since neither chloroprene nor Neoprene is explosive or even inflammable.

The du Pont organization is confident that the plant can be rebuilt in such a manner as to prevent a similar accident in the future, and it plans on taking the further precaution of isolating the equipment which offers any such hazard.

## Business Survey

In the most ambitious business inquiry ever undertaken by an independent organization Dun & Bradstreet, Inc., 290 Broadway, New York, N. Y., asked every manufacturer, wholesaler, jobber, and retailer in the country "How's Business?" in 2,000,000 questionnaires mailed during January. This inquiry, tantamount to taking the mass pulse of American business, will make available, within two months, a rapid, but yet comprehensive report on the trend of trade. The speed with which the information is made available will depend on the promptness with which the questionnaires are answered, and the size of the sample available for analysis.

The inquiry, known as "The Business Trend Survey," replaces the "Retail Survey" conducted for the past four years, and has determined the profitable operating averages for more than 100 retail trade classifications. The "Retail Survey" will not be undertaken this year as the four-year study revealed little shift in the annual percentages, and these were commonly in the expected direction.

The "Business Trend Survey" figures will first be published on a summary basis, but detailed regional and trade analysis will follow within a short period thereafter. Figures will be published in this magazine on the rubber trade and its affiliated lines as soon as the Research and Statistical Division of Dun & Bradstreet makes them available. Naturally the dispatch with which this important evidence is made public depends upon the degree of enthusiasm manifest by our readers. If you have mislaid your questionnaire, another copy will be furnished you by the nearest Dun & Bradstreet office, or by writing direct to this magazine.

## I.R.R.C. Reduces Rubber Shipments

At a meeting on January 25 the International Rubber Regulation Committee voted to restrict rubber shipments during the second quarter of 1938 to 60% of the basic quota. Presumably the committee desires to reduce stocks somewhat so as to raise the price to between 16 and 20¢ per pound and is acting on the belief that the 70% permissible, in effect for the first quarter of 1938, will not effectively cause such reduction as is necessary to attain that end.

It is understood that the regulating committee intends to be conversant with the situation and take action when and if necessary in order to insure an ample supply of rubber to accommodate requirements.

This reduction from 70 to 60% appears to be rather drastic from the viewpoint of the American market, but possibly the recent action by Germany and Japan toward further restriction of crude rubber imports may have been considered by the regulating committee when arriving at this decision.

## Catalog of Trade Data

About 200 monthly statements, official statistics of imports and exports of important commodities, are issued monthly by the Bureau of Foreign and Domestic Commerce, Washington, D. C., to about 7,000 paid subscribers. Exporters, importers, manufacturers, purchasing agents, banks, transportation companies, investment houses, and research agencies all find some of these statements of direct value in their business. Many firms do not know that such information is regularly available A catalog listing these statements, showing the commodities covered and the subscription rate for each statement, will be mailed free to any American firm on request.

**Keasbey & Mattison Co.**, Ambler, Pa., recently appointed the American Cyanamid & Chemical Corp., 30 Rockefeller Plaza, New York, N. Y., exclusive distributer for K&M magnesium carbonate, oxide and calcined magnesia.

## Standardization of Camel Back Dies

After more than a year of study the Tire Accessories and Repair Materials Committee of The Rubber Manufacturers Association, Inc., has announced a standardization program on camel back dies. Die sizes had been added gradually until the number of sizes totaled over 2,300. One reason for this large accumulation was that die sizes having the same crown width were being made up in too many variations in base width.

Based on a popularity report covering the different die sizes, a standardization program was submitted for approval to the mold companies and to the manufacturers of camel back. The program as officially adopted calls for the following: Standard camel back die sizes are those having their crown, base, and wing dimensions all graduated in ¼-inch steps, omitting the odd eighth-inch fractions (sizes ending in ⅛-, ⅜-, ⅝-, and ⅞-inch become now standard dies.)

In putting the program into effect it is realized that at the start it will be necessary to continue furnishing retreaders with certain non-standard dies until they understand the new program. Any new dies to be made up must conform to the standardization program. Retreaders, retreading equipment companies, and manufacturers of camel back will find the standardization program to be of very definite practical value.

## Commodity Exchange News

The board of governors of Commodity Exchange, Inc., 81 Broad St., New York, N. Y., at a meeting on January 20 reelected Floyd Y. Keeler president for 1938 for a third term and Martin H. Wehncke treasurer for a second term. The vice president elected to represent the Rubber Group is Harry A. Astlett, of H. A. Astlett & Co., 60 Water St., New York, who was a governor of the exchange for one year and succeeds as vice president Charles T. Wilson, of Charles T. Wilson & Co., 99 Wall St.

The annual election of the exchange whereby the governors were chosen took place on January 18. The governor for the Rubber Group is Marcus Rothschild, of M. Rothschild & Co., 80 Broad St.

Commodity Exchange in its fifth annual report gives the trading volume of crude rubber in long tons for its past five fiscal years (December 1 to November 30), as follows: 1933, 1,013,680; 1934, 1,280,730; 1935, 763,990; 1936, 381,410; 1937, 950,210. Except for tin, all seven commodities listed (crude rubber, raw silk, hides, copper, tin, lead, zinc) showed pronounced increase in 1937 over 1936, and crude rubber showed by far the greatest weight of any commodity handled by the exchange.

## New Electrical Contact Switch on Way to Record

Apparently as good as the day the test started, a new contact designed for use on cloth guiding machines, on January 2 passed the mark of 24,000,000 separate contacts. The inventor, Robert Hetherington, Sharon Hill, Pa., after examination of the parts, said that the probable life of the contact is in excess of 200,000,000 makes and breaks. The tests are being conducted under service conditions at a rate of 12,000 contacts per hour, operating a 110-volt four-ampere solenoid which activates a cloth guider developed by H. W. Butterworth & Sons Co., Philadelphia, Pa., manufacturer of textile finishing machinery.

Unusual features of the contact are: the speed at which it will operate, up to 25 times per second; the small movement required, about ⅛-inch; and the light pressure necessary, about one ounce.

Recently demonstrated to a group of engineers by the inventor was another contact made on the same principle as the one on test; but a three-phase type which, under a 220-volt 80-ampere load, is said to have neither sparked nor arced. This contact measures 1⅝ by 5 inches, and the contact under test measures 1⅝ by 2½ inches. Both contacts are completely enclosed, but are not the mercury, vacuum, or oil type.

## Laboratory Manager

Oliver Mills Hayden, manager of the rubber laboratory of the Rubber Chemicals Division, E. I. du Pont de Nemours & Co., Inc., Wilmington, Del., has had an interesting and varied career. He was born in Windsor, Conn., August 20, 1893, and attended the local grade and high schools and Clark College, where he majored in chemistry.

Upon graduating, a Bachelor of Arts in 1914, Mr. Hayden entered the insurance business and served the Phoenix Mutual Life Insurance Co., Hartford, Conn., until he joined the Hartford Accident & Indemnity Co., Hartford, the next year. When the United States entered the World War in 1917, the zealous young patriot enlisted in the U. S. Army and was commissioned in 1918. He retained his interest after mustering out of the service by serving in the Quartermasters' Reserve Corps U.S.A. for four years as first lieutenant.

After returning to mufti in November, 1919, Mr. Hayden found employment with The Fisk Rubber Co., Chicopee Falls, Mass., and worked successively as tire builder (1920), at general laboratory routine (1921), product control laboratory (1921), as factory trouble shooter (1922), and compounder (1923-26). He left Fisk in July, 1926, and took a compounding job in the du Pont rubber laboratory. That laboratory was then a section of the Technical Laboratory of the Dyestuffs Division. In 1930, however, a Rubber Chemicals Division of the Organic Chemicals Department was created, and the rubber laboratory was set up as a unit of the new division, at which time Mr. Hayden was put in charge of the laboratory.

Kennard-Pyle Co.

O. M. Hayden

He is a Mason; chairman, Committee D-11 on Rubber Products, American Society for Testing Materials; and active in the affairs of the American Chemical Society, having been on the executive committee of the New York Group (1935) and of the Rubber Division (1936). Mr. Hayden has also presented several papers and talks of interest to the rubber industry. Hiking, gardening, and poking about the islands of the Caribbean Sea appeal to him for his leisure hours.

Mr. Hayden is married and resides at 1018 Overbrook Rd., Wilmington. His daughter Jane is a freshman at Oberlin College.

**E. I. du Pont de Nemours & Co., Inc.,** Wilmington, Del., on January 23 announced it will award six post-doctorate fellowships and eighteen post-graduate fellowships for the academic year 1938-39. These fellowship awards, at eighteen leading universities and colleges, are made annually to encourage promising students in research work in chemistry. The institutions will select the beneficiaries of the fellowships and the research subjects as well. An appropriation of $26,500 has been made for the fellowships.

**T. A. Maguire & Co., Inc.,** 50 Broad St., New York, N. Y., recently was incorporated to deal in crude rubber, serving both factories and dealers. President T. A. Maguire was formerly head of Alden Successors, Ltd., (1912-1925), and of Servus Rubber Co., Rock Island, Ill., (1925-1932), and more recently was connected in an advisory capacity with the Chase National Bank.

## Trade Agreement Negotations with the United Kingdom

The Secretary of State issued formal notice on January 8 of intention to negotiate a trade agreement with the United Kingdom and with that government on behalf of Newfoundland and the British Colonial Empire. All information and views in writing and all applications for supplemental oral presentation of views, in regard to these negotiations, should be submitted not later than 12 o'clock noon, February 19, 1938, to the Chairman, Committee for Reciprocity Information, Old Land Office Bldg., Eighth and E Sts., N. W., Washington, D. C.

A public hearing will be held at 10 a. m. on March 14 before the Committee for Reciprocity Information in the Old Land Office Bldg., where supplemental oral statements will be heard. Appearance at hearings before the committee may be made only by those persons who have filed written statements, and statements made at such hearings shall be under oath.

The announcement is accompanied by a long list of articles, many of great importance, which will be considered for the possible granting of concessions by the United States. Included in the list are chemicals, many types of textiles, and manufactures of leather and of rubber. The following chemicals and related products, of interest to the rubber industry, are included in the list with their present rate of duty: stearic acid, 25%; chalk or whiting or Paris white, precipitated, 25%; magnesium carbonate, precipitated, 1.5¢ per pound; magnesium oxide or calcined magnesia, 7¢ per pound; litharge, 2.5¢ per pound; iron oxide and iron hydroxide pigments, not specially provided for, 20%; zinc oxide and leaded zinc oxides containing not more than 25% of lead, in any form of dry powder, 1.75¢ per pound, ground in or mixed with oil or water, 2.25¢ per pound; China clay or kaolin, $2.50 per ton; coal-tar products, free; india rubber and gutta percha, crude, including, Jelutong or Pontianak, guayule, gutta balata, and gutta percha fit only for manufacture, free; and sulphur in any form, free.

## Fire Hazards Discussed

Modern industry, by the creation of special fire hazards, has made necessary the development of new technical methods of fire fighting, C. B. White, chief chemist, American-La France & Foamite Industries, Inc., told members of the Metropolitan Chapter of the American Society of Safety Engineers at a luncheon January 20 in the Hotel Astor.

"Today," he said, "our fires even in free-burning materials are apt to be of greater proportions than formerly because of the centralization of industry into larger units; but in addition we

(*Continued on page 78*)

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# OHIO

THE current year should be a good one for tire renewal business. During our worst depression, which started late in 1929, car registration advanced, not slackened. In 1937 there were reported 4,000,000 more motor vehicles than in the boom year of '29. A major depression did not reduce car registration; it seems unlikely the present recession will. If it should lower 1938 motor vehicle production below last year's figure, this year's tire renewal sales should not suffer. Older cars, needing casings, will be driven more; used cars will be purchased more. The average motor vehicle is being driven more miles each succeeding year. This fact points to an increasing potential replacement market, even though tires are constantly being improved to wear longer. Also, it is calculated that within a few years the total dollar value of truck tire renewal sales will equal that of passenger car tires. The use of truck tires this year will benefit by the spur given home construction and building generally by the government.

An important factor for the manufacturer of rubber goods for use on farms is that farmers generally are in a better financial position than they have been for some time. Crops have been good, and prices have been high for the past two years. The average farmer has reduced his debts and is better able to modernize his farm equipment. This improved financial position of the farmer and the increasing acceptance of rubber in agriculture should mean for the manufacturer a greater changeover business this year, especially for tractor tires.

The leading tire manufacturers who supply the primary market anticipate a smaller volume of original equipment business than enjoyed last year. But it is believed, according to one authority, that 1938 will bring many important developments and trends for the rubber and tire industry, such as: a slowing down of the decentralization program; a probable return to the eight-hour day by tire makers, with attendant benefits to labor and increased production schedules; registering of tire prices under the Fair Trade Laws of the various states; increased consumption of crude rubber per tire because of larger tires; a stiffening of crude rubber prices under the reduced export quotas, probably averting lower tire prices; a discard of the road hazard guarantee and universal adoption of the new standard lifetime tire warranty; and greater development of increased and new uses of rubber.

## General Tire Report

Sales increase of approximately $3,500,000 in 1937, or 19.4% better than 1936, was reported January 18 to the stockholders of the General Tire & Rubber Co. at their annual meeting at Akron, by President W. O'Neil. Net sales for the past fiscal year, which ended November 30, 1937, were $21,392,956.54, against $17,909,886.26 for 1936.

Net profit for the year was $808,913.41, or $1.25 per common share, after all charges and after provision for federal income taxes and surtax on undistributed profits. Net profit for 1936 was $1,291,011.45.

Current assets were reported as $10,287,211.27, and current liabilities at $3,119,765.64, showing a current ratio of approximately 3.3 to 1. Cash on hand at the close of the year totaled $689,055.75, and notes payable to banks amounted to $2,000,000. The company has no bonds or funded debt.

During the year $127,700 in preferred stock was retired through purchases for sinking fund, reducing the outstanding preferred stock to $2,671,500.

"Our dealers have had a successful and profitable year and have obtained their share of the higher quality business," President O'Neil said. "The results for 1937 are disappointing. While sales maintained a satisfactory level throughout the year, drastic declines in prices of crude rubber and cotton necessitated substantial write-offs in inventory. . . . Inventories at the year-end are priced at the lower of cost or market, such basis being used in respect to the material content of finished and in-process inventories, as well as to raw material on hand. Provision has also been made to reduce raw material commitments to market."

In order to conform to a requirement of the New York Stock Exchange that copies of the annual report must be mailed to all stockholders 15 days in advance of the annual meeting, the stockholders' meeting was adjourned January 18 to February 9, at which time directors will be elected, who will name company officers.

## Goodyear News

The Goodyear Tire & Rubber Co., Inc., Akron, last month sent Ray Perin, of Mechanical Goods Development, and Wm. C. Newlon, supervisor of v-belts, to its plant at Wolverhampton, England, where they will start the manufacture of rubber belting.

### Airfoam in Seats

Goodyear now is manufacturing its Airfoam (a latex product) into truck and bus seats and backs and can provide truck and bus manufacturers with the material molded to desired shapes and sizes when vehicle purchasers specify its use. Renewal or replacement sales will be accepted when orders are for sufficient volume. Mattresses of Airfoam were announced last spring.

Among the advantages listed for bus and truck seats and backs of Airfoam are the following: require no repairs; do not get hot as every movement of the body pumps air through the porous structure; and are dust, germ, and moth proof, slightly antiseptic, repelling vermin and moths.

### Plioweld in Continuous Strip Process

Goodyear's Plioweld (rubber lining which resists corrosives) is used as follows as protection to equipment in preparing steel sheets for the automotive industry by the operation known as continuous strip pickling: rubber-lined steel vats; rubber-lined sewer system; tanks hooded with rubber-lined covers; rubber-lined air ducts; rubber-lined scrubbers; rubber-lined piping; rubber-lined fan unit; rubber-lined stack or outlet; rubber-covered steel mill rolls; rubber-lined drip pans; and rubber-covered roll with rubber-covered frame.

## Goodrich Activities

### Car Uses 175 Rubber Parts

Engineers of the B. F. Goodrich Co., Akron, report a modern automobile has 175 rubber parts, 140 in the chassis and 35 in the body.

### New Appointments

Appointment of N. A. Glantz to the newly created post of field sales promotion manager of the tire division recently was announced by P. C. Handerson, director of advertising and publicity for Goodrich. In his new position Mr. Glantz will represent the advertising and sales promotion departments in the application of all advertising and merchandising programs in the field. He formerly had been in charge of the creation of retail advertising. E. D. Nathan, assistant manager of tire and battery advertising, now assumes these duties.

William Sewall, assistant manager of the company's petroleum sales department since 1933, has been named department manager succeeding J. P. Woodlock, resigned, according to C. B. O'Connor, Goodrich general tire sales manager. Mr. Sewall came to Goodrich in October, 1929, when it purchased the Hood Rubber Co., and became advertising manager of the Hood and Miller tire division. He had been assistant to the tire sales manager and tire advertising manager for Hood at Watertown, Mass.

### Revised Pension Plan

Under a revised pension plan effective January 1 all Goodrich employes will retire on a schedule which by 1942 provides for automatic retirement at 65

for men and 60 for women. The plan was designed to augment benefits of the federal Social Security Act.

The revised Goodrich retirement plan, in which contributions are made jointly by employes and the company, provides the former with the opportunity of materially supplementing income at retirement. The plan provides for life incomes at normal retirement, insured through the Aetna Life Insurance Co., Hartford, Conn.

**Replacement Business**

With auto registration at a new all-time high of 29,650,000 units on January 1, the market for replacement tire sales has been broadened considerably in the past year, S. B. Robertson, Goodrich president, declared in a recent statement. Approximately 29,100,000 renewal casings were sold in 1937, or about 1.03 for each of the 28,221,291 cars and trucks registered January 1, 1937, and a similar ratio in 1938 would mean sales of about 30,600,000 replacement tires in the current year, Mr. Robertson said, or an increase of 1,500,000 casings.

"Naturally, the present business recession may impair consumer purchasing power and throw this estimate out of line. However . . . it is significant that in 1933 about 30% of the families with no incomes at all owned automobiles, according to a survey by the Automobile Manufacturers Association. Should an upturn in replacement tire sales materialize in 1938, it will be very helpful to tire manufacturers because renewal sales account for roughly 60% of total tire business."

Mr. Robertson stated that the long-term trend of replacement tire sales has been showing some stability since the beginning of 1936, after a seven-year decline from the 52,500,000 mark established in 1928.

"Paradoxically, this drop in replacement tire volume was partly brought about by rubber manufacturers themselves in their competitive efforts to provide the American public with the best possible tire for the least money. Better tire cord fabric, greater rubber content of tires, improved tread designs, have all contributed to the lengthened life of the modern tire," he said.

**De-Icers for Land Transport Plane**

Plans for the biggest rubber de-icers, or airplane "overshoes," ever built for a land transport airplane, have just been completed, according to James Pedler, manager of the Goodrich aviation division. The de-icers are for a 40-passenger super-transport plane now under construction at the Douglas plant in California; the 30-ton giant air liner is scheduled for completion this spring.

Designed to be made in 10 sections for the 130-foot wings of the huge plane, the de-icers will be more than 104 feet long. There will be seven parallel tubes in the "overshoes" for the wings of the plane; whereas the conventional sizes consist of only three tubes. With a width of 36 inches at the end closest to the cabin of the plane, the de-icers will taper to a width of only 6½ inches, and including only one tube, at the wing tip. Leading edges of the tail surfaces will also be covered with de-icers, and other ice-combatting equipment will include rubber "caps" for each of the four propeller hubs to protect the moving parts, and "slinger rings" to bathe the propellers with an anti-ice solution.

**Twenty-Year Club Membership**

Goodrich's Twenty-Year Service Club, now has 1,818 members, following the semi-annual pin presentation ceremonial, when the latest group of 120 Akron employes was presented 20-year emblems. Besides 10 others in the nation-wide field organization who had completed 20 years with the company since last June were honored. More than 2,000 members of the club and their families attended the ceremonial. T. G. Graham, Goodrich vice president, presented the pins in the absence of President S. B. Robertson. Mr. Graham pointed out that there are 1,631 members of the club on the active pay rolls of the company, and that of these, 1,352, or five out of six, were more than 45 years of age. There are 187 club members on the company's pension pay roll.

**Truck Tire Record**

C. L. Barcus, in the contracting business in Powell, O., has written the Goodrich company that a 30x5 truck tire which he purchased several years ago has already given 130,000 miles of continuous service. It has worn out two trucks and is now on the third one.

## Development Manager

William Smock Wolfe, since April, 1937, manager of the development department of the Goodyear Tire & Rubber Co., Akron, was born in Pawling, N. Y., December 7, 1890. He was educated at Marietta College (A.B., 1910) and Massachusetts Institute of Technology (B.S., Chem. Eng., 1912).

W. S. Wolfe

Mr. Wolfe joined the Goodyear development department in 1912 and in 1915 was made foreman of the bicycle tire department. Two years later he was put in charge of pneumatic tire development work. In 1918, however, he was with the Motor Transportation Corps, Washington, D. C. Back at Goodyear, on March 1, 1919, Mr. Wolfe organized the technical service department and was named its head. When he resigned from the Goodyear development department in 1921, he became vice president in charge of production and factory manager for the Seiberling Rubber Co., Akron. He left that post as of January 1, 1934, and for four months during 1934 held the temporary position of general factory manager for Kelly-Springfield Tire Co., Cumberland, Md. Then back to Goodyear to engage in truck tire sales. In 1936 Mr. Wolfe was appointed assistant manager of the truck tire department. His next job was his present one.

He belongs to Delta Upsilon and Phi Beta Kappa. In 1924 he served on the tire executive committee of the Rubber Association of America and from 1930 to 1933, inclusive, on the directorate of The Rubber Manufacturers Association, Inc.

He is the father of a 12-year-old boy. They make their home at 2051 Ridgewood Rd., Akron.

## Rubber and Skiing

Formerly only a minor sport, skiing within seven years has given rise to a $20,000,000 industry in America, according to figures in a survey made by The B. F. Goodrich Co., Akron, to determine the possibilities for new rubber uses in skiing. This survey resulted in the development of a rack which can be mounted by rubber fittings on the tops of closed automobiles. This rack permits easy carriage of skis with no danger of damage to cars. Also rubber is used for the rings of ski poles and for a new type of ski climber to enable skiers to walk uphill easily, which is molded of rubber and fastens on the underside of the ski at the binding by means of a special strap and buckle, without necessity of removing the ski.

If predictions of heavy snows for this winter materialize, it is estimated more than a million skiing enthusiasts will spend upwards of $3,000,000 in sporting goods stores for equipment and $6,000,000 more for special clothing, as ski jackets and boots. Besides about $3,000,000 will go for lodging at ski resorts, $3,000,000 for transportation, $500,000 to ski instructors, and nearly $5,000,000 more for incidental travel items.

Skiing, as an industry in America, dates from the "white" winter of 1930 when a special train left Boston's North Station bearing a handful of skiers to the White Mountains.

## NEW ENGLAND

**Globe Rubber Works, Inc.,** 45 High St., Boston, Mass., on January 14 and 15, held its semi-annual two-day sales conference attended by the entire sales force. A most optimistic tone was noted at the meeting as salesman after salesman reported that the past year has proved their most successful and each was looking forward to still better business in 1938. The general sessions were presided over by President Arthur I. Knowles; while the discussion conferences were directed by Sales Manager C. J. Leonard. F. W. Blanchard conducted the conference on conveyer belts and transmission belting; J. F. Flanagan, matting and treads; J. R. Coveney, oil hose and general mechanical goods for industry; E. E. Smith, perforated mats; and C. W. Knowles, advertising and sales promotion plans. The yearly cash prize for the largest individual sale was awarded Mr. Blanchard, with Mr. Flanagan taking second honors. A feature of the session was a banquet held at the Essex and attended by the salesmen, department heads, and company executives.

**Woonsocket Association of Manufacturers** was recently organized by representatives of about 50 industrial plants employing thousands of mill workers in Woonsocket, R. I., including the American Wringer Co., whose vice president and general manager, George R. Keltie was elected a member of the association's executive committee. The purpose of the association is to promote the industrial growth of the city and to aid existing industries in the solution of their various problems. It also will collect information and statistics on employment, freight rates, wage rates, and general industrial activities in Woonsocket and vicinity.

**United States Rubber Products, Inc.,** will erect a three-story addition to its plant at 58 Hemlock St., Providence, R. I., to be of brick 41 by 17 feet and it will be used for storage purposes and repairs.

**The Fisk Rubber Corp.,** Chicopee Falls, Mass., according to Factory Manager C. E. Maynard, on January 13 appointed Arthur E. Benson manager of the product development department, which covers mainly tire development and mold engineering. Gustave Hubach was named assistant manager of the department at the same time.

**William R. Todd,** secretary and treasurer of the Sponge Rubber Products Co., Derby, Conn., recently was inducted as president of the Shelton Kiwanis Club, Shelton, Conn. On the club's board of directors is Frederick M. Daley, president of the Derby concern.

*Egan Photo Service*

Bradley Dewey

### Company Head

Bradley Dewey has been president of Dewey & Almy Chemical Co., 62 Whittemore Ave., Cambridge, Mass., since its incorporation in 1919 and has taken out many patents connected with the rubber industry.

He attended Harvard University, from which he was graduated with an A.B. degree in 1908. The next year he received a B.S. in chemical engineering from the Massachusetts Institute of Technology. He has long been active in M. I. T. affairs and served one year as president of the Alumni Association. For five years he was a term member of the Corporation of Massachusetts Institute of Technology and in 1937 was elected a life member of the Institute's governing board.

This executive also belongs to the American Chemical Society and in 1933-34 was chairman of the Boston Group, Rubber Division. During the World War, Colonel Dewey received the Distinguished Service Medal for his work in charge of the Gas Defense Division, Chemical Warfare Service.

He is a native of Burlington, Vt.; the date, August 23, 1887. He is married and the proud parent of two sons and two daughters. His home is at 21 Concord Ave., Cambridge.

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**Appleton Rubber Co.,** Franklin, Mass., through Vice President and Superintendent Robert Cowen played host on January 13 to members of the Franklin Rotary Club, when they were conducted through the plant, where every department was in full operation. The firm makes reclaimed rubber and friction and insulating tape. Other executives follow: president and treasurer, James I. Finnie; secretary, M. E. Murphy; purchasing agent, T. Forgit.

## FINANCIAL

*Unless otherwise stated, the results of operations of the following companies are after deductions for operating expenses, normal federal income taxes, depreciation, and other charges, but before provision for federal surtax on undistributed earnings. Most of the figures are subject to final adjustments.*

**Dayton Rubber Mfg. Co.,** Dayton, O., and subsidiaries. Year to October 31: net income, $334,834 after $220,528 inventory write-down, $53,988 for federal surtax, and after $112,632 provision for reserve for loss on purchase commitments. The income is equal after annual dividend requirements on 46,518 shares of $2 cumulative Class A stock, to $1.37 each on 176,839 no-par common shares. Net income in the preceding year amounted to $510,465, or $2.46 a share on 169,691 common shares then outstanding. Sales of $8,429,841 in the fiscal year, the largest in the company's history, were 16.7% more than in the previous twelve months.

**Firestone Tire & Rubber Co.,** Akron, O., including all domestic and foreign subsidiaries and Firestone Auto Supply & Service Stores. Year ended October 31, 1937: total sales $156,823,094, the largest in the firm's history and 15% above the $135,701,916 for the previous year. After writing down to market all raw materials on hand and all commitments and providing for federal taxes and all other charges including $5,946,885 for plant depreciation, net profit was $9,269,177. After dividend requirements on the 6% preferred stock the profit is equivalent to $3.33 each on the $10-par common stock, contrasted with a profit for the previous fiscal year of $9,142,654, or $3.28 a common share.

**Lee Rubber & Tire Corp.,** Conshohocken, Pa. Year ended October 31: net profit, $596,318, equal, after expenses, depreciation, and taxes, including $17,927 surtax on undistributed income, to $2.31 a share on the 257,465 capital shares outstanding and compares with $563,825, or $2.20 a share on 256,465 shares in the preceding fiscal year. Net sales for the year were $13,769,152, more than 25% over the $10,599,693 of the preceding fiscal year.

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### Rubber Oil Can Spout [1]

A rubber spout for oil cans has a circular rib at the can end which restricts the flexibility of the spout for clamping it upon the ribbed neck of the can. A conical metal nipple in the bore of the spout at the rib section resists distortion of the spout and prevents clogging because of the tapered shape of the nipple at the neck of the oil can.

[1] U. S. patent No. 2,098,128, Nov. 2, 1937.

# NEW JERSEY

RUBBER conditions in New Jersey have shown little, if any change recently. Manufacturers expect spring orders for hose, belting, and jar rings to stimulate trade, and increased production of other mechanical goods should follow. Heel and sole production is holding up very well.

**Jos. Stokes Rubber Co.,** Trenton, reports that business in the hard rubber lines improved at the Trenton plant, but orders fell off at the Welland, Ont., Canada, factory. P. O. Gunkel, vice president and general manager of the latter unit, has announced the firm awarded a contract for the construction of a factory at an estimated cost of $35,000.

**Fred E. Schluter,** president of the Thermoid Co., Trenton, has been made president of the Boys' Club of Trenton. He will shortly have a gymnasium building added to the present Community House occupied by the boys. Mr. Schluter recently entertained 37 members of the Foremen's Club of the Thermoid Co. at the Stacy-Trent Hotel. Guests of honor were Harry Magowan and George E. Voorhees, who have been Thermoid employes for 51 and 55 years, respectively. The latter has also been secretary of the Thermoid Beneficial Association for many years. The toastmaster was George Fabel, president of Southern Asbestos Co., Charlotte, N. C., a Thermoid subsidiary, and Carl A. Schell, of Detroit, chief engineer, also was present.

**Essex Rubber Co.,** Trenton, reports a gain in business after contacting the trade in New England. Officials, however, believe the improvement will be slow from now on.

**Lambertville Rubber Co.,** Lambertville. Confirmation of a bankruptcy referee's report on the Lambertville company, has been directed by Federal Judge Philip Forman. The report recommended acceptance of an offer of $100,500 for the assets of the company not covered by mortgages. Charles H. Weelans, referee in bankruptcy, made the recommendation after a hearing for creditors, trustees, and other interested parties. He advocated the acceptance of the bid by Samuel S. Flug, of New York, provided a reorganization plan proposed by trustees could be properly indemnified. It was reported at the hearing that the company is in debt to the extent of $540,000. The organization plan involves paying creditors in cash, and mortgaged indebtedness would be taken care of over a three-year period. Creditors would be given preferred stock in the new corporation, with old stockholders receiving common stock.

Later it was learned that the assets and good will of the Lambertville Rubber Co. were bought through the courts by Max Kalter, who owns the Servus Rubber Co., Rock Island, Ill. The transaction did not include the plant or equipment.

**A. W. Faber & Co.,** Newark, recently granted a bonus of $50 for every worker with the firm a year or more. The company employs 125 hands in the manufacture of rubber stationery items and pencils.

**The Watson-Stillman Co.,** manufacturer of hydraulic machinery, Roselle, N. J., has transferred its district sales office from Columbus to the Book Building, Detroit, Mich., where J. C. Grindlay is in charge.

**William H. Sayen,** president of the Mercer Rubber Co., Hamilton Square, recently returned from a trip through the West, said: "I believe that business will soon pick up and remain good from now on. The year 1937 was one of our best, although it has slackened up a little." Instead of laying off help when orders begin to drop, the company places employes in different positions at the plant.

**Acme Rubber Manufacturing Co.,** Trenton, following the death of John A. Lambert, vice president and treasurer, made several executive changes. Edward T. Comly, secretary has been named vice president; while E. C. Connolly becomes treasurer. J. Edward Myers, superintendent, will remain in that capacity and also act as secretary.

**Drs. William Gibbons and R. H. Gerke,** both of the General Laboratories, United States Rubber Products, Inc., Passaic, recently were elected ordinate councilors of the North Jersey Section, American Chemical Society.

**Viceroy Mfg. Co., Ltd.,** West Toronto, Canada, has announced that construction is now well advanced on the three new buildings being added to its plant, which will add about 30,000 square feet to the company's plant, giving a total area of some 137,000 square feet. The main addition is a four-story administration building, 130 feet wide by 47 feet deep, which will house executive, plant, accounting, and sales offices, engineering department, chemical laboratory, and employe rest rooms. To the rear of this structure, a one-story manufacturing building, 65 by 86 feet is being erected. To provide for future expansion foundations are designed to carry three additional stories. This building, as well as the administration building, is of brick and timber construction. The third unit is also a manufacturing building of one story, brick and concrete, 16 by 122 feet. The completion of this building program, necessitated by a steadily increasing demand for the company's products in both the domestic and foreign markets, will allow a rearrangement of manufacturing departments which will make for more efficient production and better working conditions for all employes. It is anticipated that these additions, which will cost about $70,000, will be completed and ready for occupancy by March 1.

Plant of Vansul, Inc., Englewood, N. J.

**Fig. 1. Outside View. Fig. 2. Master Batch, Cutting, Packing, and Shipping Room. Fig. 3. One End of the Laboratory. Fig. 4. Color Master Batch Unit No. 3, Coupling Tanks, Colloid Mills, Drier, 60-Inch Sheeting Mill**

THE PURCHASING VALUE OF THE DOLLAR in December, 1937, was 112.9¢, against 112.4¢ in November, 116.1¢ in December, 1936, and 100¢ in 1923.

## MIDWEST

### Monsanto News

Monsanto Chemical Co., St. Louis, Mo., recently announced that William M. Rand, president of the subsidiary, Merrimac Chemical Co., Everett, Mass., and a director of the parent company, has been made a vice president of the Monsanto organization. News was also received at the same time of Mr. Rand's election to the presidency of Associated Industries of Massachusetts.

#### Awards

The Merrimac plant recently was honored in a safety campaign. Mr. McBrayne of the Massachusetts Safety Council presented to the company the Council's banner for operating during the third quarter of 1937 without a lost-time accident. The banner was received by O. Bezanson, Merrimac vice president.

Charles Belknap, Monsanto executive vice president, awarded the Monsanto pennant to Merrimac for operating the best appearing of all of Monsanto's large American plants. The emblem was received for the company by Mr. Rand. The award to the smaller plants went to the **Norfolk, Va.,** factory.

Edgar M. Queeny, Monsanto president, has presented a second safety trophy to go into competition, beginning with the first quarter of 1938, among the five smaller plants, known as the Group II plants. The new trophy will be given to the plant that wins the first leg on it by having the greatest number of accumulated man hours without a lost-time accident at midnight March 31. The record for 1937 will be included, and the man hours will be counted from the date of the last lost-time accident.

The first cup becomes the Group I trophy and will continue in competition among the six large plants of the Monsanto organization.

#### Acquisition of Fiberloid Corp.

Mr. Queeny has announced that the directorates of both companies had approved contracts providing for the acquisition of The Fiberloid Corp., Springfield, Mass., by Monsanto in exchange for capital stock of the Monsanto company on the basis of seven shares of Monsanto for twelve shares of Fiberloid.

The Fiberloid Corp., established in 1892, is a leading producer of plastics and molding compounds. Its products include sheet plastic for use in windshields, cast phenolic resins, nitrate plastic of the celluloid type, and cellulose acetate molding powders. The company, in partnership with the Shawinigan Chemical Corp., Montreal, is now erecting a large plant at Springfield to produce plastics of the vinyl acetate type. Monsanto has been the principal supplier of Fiberloid's basic raw materials, and the research and development staffs of the two companies, working as a unit, will prove helpful in keeping abreast in this rapidly moving field.

Fiberloid employs approximately 1,100 people. Its capitalization consists solely of 254,000 shares of common stock with assets exceeding $7,000,000, and for the past year its net earnings are expected to approximate $3.75 a share. On the basis of exchange, Monsanto will issue 148,500 shares, of which approximately 21,000 shares will revert to Monsanto's treasury; 1,262,911 Monsanto shares will then be outstanding.

Fiberloid's stockholders are expected to ratify the sale at their meeting February 16, and it is anticipated that John C. Brooks, president of the corporation, will become a vice president and director of Monsanto Chemical Co. Mr. Queeny stated that no change in the personnel, methods of operation, or policies of The Fiberloid Corp. are contemplated by Monsanto.

### SAE Meeting

The Society of Automotive Engineers held its annual meeting at the Book-Cadillac Hotel, Detroit, Mich., January 10 to 14. A feature of the convention was displays of synthetic rubber as used in the modern automobile, including such objects as carburetor, gas tank filler, and vacuum gear shift hose; horn wire insulation; water pump, dust, grease, oil, and radiator cap seals; oil pan gasket; diaphragms for vacuum-operated spark, choke, and starter switch controls; booster brake equipment; as well as service station and paint spray hose. The exhibits were sponsored by E. I. du Pont de Nemours & Co., Inc., Wilmington, Del., and Thiokol Corp., Yardville, N. J.

Du Pont's varied display of Neoprene chloroprene rubber, arranged by its Rubber Chemicals Division, featured a window layout showing the chemical composition of Neoprene and the comparative properties of Neoprene and rubber; a schematic diagram of an automobile chassis revealing the Neoprene parts, supplemented by a display of these parts assembled and unassembled; Neoprene and rubber under test showing the comparative behavior when immersed in SAE 30 motor oil at room temperature and at 212° F., in gasoline at room temperature, in Diesel oil at room temperature and at 212° F., and an exhibit of Neoprene fabrics, sheet material, molded parts, cork-Neoprene compositions, and asbestos-Neoprene compositions.

"Thiokol" synthetic rubber, pioneer of its type in America and discovered when a researcher was looking for a cheaper anti-freeze, was a striking example of a point made by Charles F. Kettering in his speech to the SAE. Stating that research men learn things by accident, he told the engineers that individual transportation was developed by persons "who were not too scientific, who didn't know the thing would work, but tried it."

Among the many papers read were the following of interest to the rubber industry: "What Fleet Operators Should Know About Tires" by J. E. Hale, of Firestone Tire & Rubber Co.; and "New Technique for Noise Reduction" by E. J. Abbott, of Physicists Research Co. Mr. Hale stated operators must know the proper tire to use and understand how to get the best results. He cataloged premature tire failures, out-


"Thiokol" Display at SAE Meeting

lined characteristics of available tire lines, classified types of fleet operation for proper tire equipment, and concluded with information on the care of tires and facts about repairs and retreading. Dr. Abbott declared the key to successful noise reduction is through the proper modification of the attack and the measuring equipment. He classified the various means of quieting, illustrated by practical examples. In "Previews of Progress," E. L. Foss of General Motors Corp., Research Laboratories, presented demonstrations of the wonders of science and the mysteries of research.

### Dryden Rubber Activities

George B. Dryden, president of Dryden Rubber Co., 1014 S. Kildare Ave., Chicago, Ill., manufacturer of molded, extruded, sponge, and hard rubber products for automotive and general industrial usage, recently announced the purchase of a plant in Keokuk, Iowa, for the exclusive manufacture of sponge rubber products. This plant will be known as the Rubber Industries Division, Dryden Rubber Co.

U. H. Parker has been placed in charge. He has a wide experience in the technical phase as well as the practical side of sponge manufacture, having been with the Miller Rubber Co., Akron, O., from 1919 to 1928, the Featheredge Rubber Co., Chicago, as chief chemist from 1928 to 1932, and back to Miller in 1932 as manager of the sponge rubber division.

C. O. Frazier, formerly president of the Rubber Industries, Inc., Keokuk, has also been retained by the Dryden organization there. Mr. Frazier has had twenty years' experience in the rubber industry, having held various positions as purchasing agent and secretary of Standard Four Tire Co., Keokuk, and in the reorganization of that company, which became known as the Rubber Industries, Inc., became president.

Mr. Dryden also stated that H. A. Winkelmann and R. D. Hager have joined the Chicago organization, Dr. Winkelmann to serve in a technical consulting capacity and Mr. Hager to become production manager. The former was vice president of Marbon Corp., a division of Borg-Warner, before joining the Dryden organization. Mr. Hager previously had been plant manager of the Cadillac, Mich., unit of The B. F. Goodrich Co., with which he had been associated since 1925.

### 1937 Auto Output

A recent report states that automobile production in the United States last year was the second highest on record, estimated at 4,975,000 units, compared with the high of 5,621,715 cars and trucks produced in 1929. The 1937 output, while slightly under estimates, was 8% above the 1936 figure and 250% above the depression low in 1932. For last year passenger cars totaled 4,050,000 and trucks 925,000, the latter a record, 12% over the 1929 figure.

The wholesale value of all automotive products, including accessories, replacement parts, tires, and service equipment as well as passenger cars and trucks, was $4,177,000,000 for 1937, of which cars and trucks accounted for $2,802,000,000.

Total vehicles owned in this country have reached the record figure of 29,650,000, of which 25,400,000 are passenger cars and 4,250,000 motor trucks. Highway travel, as calculated by gasoline consumption figures, which last year were 8% over those of 1936, set a new high record in 1937.

The best gain in 1937 was shown in export operations, and 650,000 vehicles were sold outside the United States. Trucks exported totaled 47% more than in 1936.

Replacement buying was a major factor in 1937 operations as data indicate the retirement or destruction of 3,000,000 vehicles during the year. It is believed, furthermore, that the replacement market will continue to exert a dominant influence upon the automobile industry.

## OBITUARY

### H. M. Davis

HARLOW MORRELL DAVIS, connected with the patent office of United Shoe Machinery Corp., Boston, Mass., for more than 25 years and since 1935 as manager of the patent division, died on New Year's Day from a heart attack. In 1934 he was appointed to the United States Patent Office advisory board and had been its chairman for the past two years. He also belonged to the patent law revision committee of the American Bar Association and to the executive committee of the Boston Patent Law Association.

Mr. Davis, who was born in Augusta, Me., 52 years ago, was graduated from Bates College in 1907 and from Harvard Law School in 1910.

He leaves his wife and two daughters, one of whom is the screen star, Bette Davis.

### Morris Baumann

A HEART ailment caused the death, on December 29, 1937, of Morris Baumann, for many years treasurer and general manager of the Baumann Rubber Co., manufacturer of rubber novelties, sundries, etc., New Haven, Conn. He was one of the founders of the company, which was organized in 1891 and from which he retired about a decade ago. Mr. Baumann is generally credited with being the first to manufacture rubber goods in colors, starting with rubber balls and toys.

He was born in Baden, Germany, 80 years ago and came to America when a youth. He went to work at the Goodyear Rubber Co.'s plant in Naugatuck, Conn., before organizing the company bearing his name.

The deceased belonged to the Connecticut Rock Lodge, Masons, serving as treasurer 21 years, Harugari Singing Society, Congregation Mishkan Israel, and Free Sons of Israel.

Surviving are his wife, a daughter, and two sons.

Funeral services were held December 31. Burial was in Mishkan Israel Cemetery.

### Pierre Michelin

LAST month we had to report the death of Jules Hauvette Michelin, on December 2, 1937. Barely one month later, on December 30, 1937, his cousin, Pierre Michelin, died from automobile injuries received in an automobile accident near Montargis, France. Pierre Michelin, who was 35 years old and a son of Edouard Michelin, head of the Michelin tire company, had been a high official in the Michelin factory and had been president and managing director of the Citroen Automobile Co. since it was taken over by the Michelin interests. He had at one time been an air pilot, but gave up flying after his brother, Andre, was killed in an aviation accident three years ago.

### John Hancock Nunn

JOHN HANCOCK NUNN, a veteran of the British rubber manufacturing industry, died on December 13, 1937, in his eighty-third year. Mr. Nunn was a descendant, through his mother, of the famous Thomas Hancock, pioneer rubber manufacturer and discoverer in England of vulcanization. The business, originally established by Thomas Hancock in 1820, was continued by his descendants for well over a century. For a number of years and until 1935, when it passed under the control of the British Tire & Rubber Co., (formerly the British Goodrich Rubber Co.), Mr. Nunn had been head of this old family business which meantime had become known as James Lyne Hancock, Ltd.

### Tire Costs

In 1910 an automobile tire costing $50 produced 5,000 miles; in 1936 a tire costing $15 gave 20,000 miles—the estimated annual savings to American motorists due to research, $3,002,580,000.

# Rubber Industry in Europe

## GREAT BRITAIN

### Latex-Treated Wool

In his report for 1936-1937 the director of research of the Wood Industries Research Association gives particulars regarding a recently patented method of rubberizing wool yarns in the hank. It seems that wool can be treated with a suitably prepared latex without matting; it can be dyed either before or after treatment, or color can be added to the latex. The process is expected to prove useful for providing strong yarns with little twist, in the manufacture of felt, and in producing surfaces that are water-repellent, moth-proof, etc. Another advantage of the treatment is said to be the remarkably increased resistance to abrasion.

### Rubber Paving Developments

To prevent further damage to valuable old buildings in Oxford as the result of vibration caused by heavy traffic, it was decided to pave certain streets with rubber. At first it was proposed to pave High Street, but for various reasons the decision finally fell on Cornmarket Street. The work was carried out by Universal Paviours, Ltd., which used black rubber Gaisman blocks for the paving proper, with bus stops and other traffic signs permanently inlaid in yellow rubber. Among the new departures noted in connection with this work may be mentioned the manhole covers topped with rubber, a line of Gaisman stud blocks running down the center of the street over its entire length, and the yellow rubber curbs of the safety islands. The street, opened for traffic last summer, presents a most attractive appearance, and if the paving proves a success in other respects, it will not be long before High Street is also rubber-surfaced.

Universal Rubber Paviours, Ltd., at present is supplying and laying rubber surrounds and edging at two swimming pools at the new baths being constructed by the Middleton Corp. The color scheme is pale green with edging of darker green. Last year the firm did similar work at two swimming pools of the new public baths at Rochdale when stone color surrounds were laid, while the rounded edgings were of black rubber. It seems that bathers like the rubber, which is said to be absolutely non-slipping because of the specially designed blocks, while the surface is pleasant and warm to the feet.

A new type of block for which important claims are made by the inventor, E. W. Coleman, is said to prevent skidding entirely, to have much higher shock absorbing properties than any other type of road block, and to have a working life of about 25 years. The design of the block is rather unusual: the surface is studded with soft red rubber and hard black rubber studs of different heights, the former being about 1½ millimeters higher than the latter. The soft studs spread under compression, thus providing two different kinds of grip, which, it is claimed, prevents slipping even under water. The studs are set at an angle of 10 degrees to carry any load and to prevent any tendency to break off.

### R. G. A. News

#### Medallists

In recognition of their services rendered to the plantation rubber industry, Sir Frank Swettenham and J. G. Hay were awarded the Honorary Gold Medal of the Rubber Growers' Association at a council meeting November 2, 1937. Sir Frank Swettenham, who became governor and commander-in-chief of the Straits Settlements in 1901, has been connected with the R. G. A. since its foundation and has served continuously as a member of its council 27 years. In 1921 he was elected vice chairman and in 1922 chairman of the association. He has always taken the keenest interest in the cultivation of rubber from the very beginning of the industry in Malaya.

Mr. Hay joined the association in 1921, became a council member in 1922, was elected vice chairman in 1929 and chairman in 1930. He originated the Commercial Research Committee, which has been doing very valuable work, and he has also served on several other important committees. Mr. Hay is perhaps best known for his work in connection with the international regulation of rubber exports.

#### Exhibit at Empire Exhibition

The R. G. A. has reserved about 4,000 square feet for the erection of a Rubber Pavilion at the Empire Exhibition, Glasgow. This pavilion will be close to the Palace of Engineering and alongside one of the main avenues. On the ground floor it is proposed to stage an exhibit which will illustrate the story of rubber from the growth of the rubber tree to the actual applications of the product in various branches of industry, transport, and sport by means of working machinery and models, glass transparencies, colored illustrations, and specimens. Demonstrations will be given at periodic intervals on the production of rubber articles, which will be distributed at the exhibition. Appropriate films dealing with the rubber industry will also be shown. In the gallery a series of rooms, including nursery, bathroom, and operating theater, will be arranged for the display of various domestic and surgical uses of rubber. The exhibits will be organized in collaboration with various manufacturers and associates connected with the rubber industry. The Rubber Pavilion will demonstrate the importance of rubber, not only to the British Empire, but as a vital factor in the development of industry throughout the world.

### Pneumatic Tires Reduce Tractive Effort[1]

Recently comparative tests in England demonstrated the superiority of pneumatic tires over steel tires for horse-drawn farm carts. Power requirements were measured by means of a dynamometer located between the whipple-tree and the axle, the load in each case being 17½ cwts.

A low loading cart and a box cart, both of which have pneumatic tires, gave average dynamometer readings from 150 to 175 pounds on grass and 300 to 350 pounds on soft ground. The cart with steel tires required an average draught of 275 pounds on grass and 475 pounds on soft ground.

The tests therefore showed that the steel-tired wheels require approximately a 50% greater tractive effort than the pneumatic tired wheels, both on soft ground and grass. Comparative tests with and without roller bearings indicated no appreciable difference in power requirement.

[1] Abstracted from *Bull. Rubber Growers' Assocn.*, Oct., 1937.

### Company News

The Avon India Rubber Co., Ltd., reports that the past business year was the best in ten years. All the company's records as to output, sales, number of employes, and exports were broken. Excellent progress was shown in all departments—tires, mechanical goods, sporting goods, flooring, etc., and apart from government orders total

sales in these goods increased nearly 14%. The increase in the sales of automobile tires alone came to 30% during the year. Net profits rose considerably, £57,803 as compared with £11,813 the year before. The chairman stated that results during the first two months of the current business year were better than for the corresponding months of the year reported on.

Net profits of India Rubber, Gutta Percha & Telegraph Works Co., Ltd., for the business year ended September, 1937, were £54,125 against £66,137. The decline in profits was not due to decreased business, but largely to increased costs resulting from the reconstruction program. New buildings have been erected, and new equipment installed. The company recently adopted a policy of closing down unprofitable branches and in line with this, sold its interest in cable manufacture on very satisfactory terms and will now concentrate on rubber exclusively.

The British Insulated Cables, Ltd., which some time ago acquired the Macintosh Cable Co., Ltd., and the Croydon Cable Works, Ltd., has decided to reduce the capital of these two companies. It also plans to concentrate the manufacture of cables at its own works at Prescot and Helsby instead of continuing the separate works of the Macintosh and Croydon companies which are at Derby and Croydon respectively.

## SWITZERLAND

Two members of the Pirelli concern of Milan, Italy, are included among the directors of the newly established Pirelli Holding Co., a Swiss-Italian firm which is to hold an interest in rubber factories and also to manufacture electrical wires and cables. The company, with headquarters at Basle, Switzerland, is capitalized at 12,000,000 francs, of which 2,400,000 francs are paid up.

## FRANCE

Recently a strike broke out at the Goodrich rubber factory in France as a result of the dismissal of an electrician whom the company charged with negligence. It seems that the man had overlooked the installation of a secret hook-up used to tap the managerial telephone wires. Premier Camille Chautemps, acting as referee, decided in favor of the company, upholding its right to dismiss a man in a matter which he said was entirely outside the domain of union labor. Nothing, however, appears to have been settled by the decision; on the contrary, last reports available state that the strike is to be continued, and that the workers insist that the discharged man be reinstated.

## GERMANY

### Research on Rubber Bearing Plants

Recently a company to be known as Pflanzenkautschuk (Strauch-und Staudenkautschuk) Forschungsgesellschaft m.b.H., that is Vegetable Rubber (Shrub and Bush Rubber) Research Co., was formed in Berlin to undertake the management of and to carry out the assignments of the Study Association of German Rubber Goods Factories for the Cultivation and Exploitation of Rubber Bearing Shrubs and Bushes. In this capacity the new company will explore and study the possibilities of cultivating rubber-bearing plants and shrubs in Germany and elsewhere in Europe, particularly in the Balkans, and will test methods of preparing the natural rubber obtained from such plants. The enterprise, capitalized at 20,000 marks, will be under the management of Friedrich Funck, of Berlin.

### Bonding Rubber to Rigid Materials

The Metallgesellschaft A.G., Frankfurt a.M., has developed a new method of bonding rubber to rigid materials like wood and metal (D.R.P. 654,128). Hitherto this was achieved by using halogenated rubber solution as cement, but perfect union under all conditions was not always attained by this means. It is claimed that a permanent union can be obtained by subjecting the rubber surface to be attached to a halogenating treatment in addition to using the halogenated rubber solution. The double effect is obtained at one time, it is said, if to the rubber surface is applied a coating of sulphurylchloride dissolved in a chlorinated rubber solution.

### New Garment Factories Banned in Berlin

As from December 24, 1937, no new factory or undertaking making garments for their own account or for others may be established in Berlin without special government permission. This ruling will continue in force to December 31, 1938, and covers the production, among others, of rubber apparel, corsets and corset material, dress shields, suspenders, garters, sleeve holders, sporting belts, and head gear.

### New System of Compresses

Ernst Erler, Berlin, recently marketed its new Hydrosan compresses, or rather compress-holders, intended for use with hot, cold, or Priessnitz compresses. They are of various shapes and sizes, depending on their destined uses, but in each case consist essentially of a rubberized muslin holder held by adjustable elastic bands or straps. Because the compresses can be very easily changed without removing the holder and are held firmly in place by the latter, considerably greater efficacy and comfort are claimed. To take the place of the customary heavy ice-cap which must be filled with chopped ice and is hard to keep in place, a comparatively light cap has been designed made of two folds of rubberized muslin, provided with suitably spaced elastic bands. The cold compresses can easily be slipped through an elastic-bordered opening in the top and applied to any part of the head wherever required. The elastic keeps the cap in place so that the head can be moved freely.

## U. S. S. R.

The trend of the Russian rubber footwear industry since the revolution and especially the rapid strides made in the last decade are brought out by recently published data. In 1913 the industry produced 24,200,000 pairs of all kinds of rubber footwear; it was practically ruined during the World War and the first few years after the revolution; and steady recovery did not really set in until around 1923. In the year 1923-1924 the output still was only 4,200,000 pairs, but thereafter it rose rapidly until in 1927-1928 it reached 25,000,000 pairs, exceeding the 1913 figure for the first time. Under the first five-year plan, which covered 1928-1932, production continued to soar, reaching at the end of this period a total of 42,000,000 pairs, which is 173% as compared with the 1913 output.

Progress slowed down considerably during the second five-year plan, which included the period 1933-1937. Indeed 1933, with a total output of only 40,400,000 pairs, showed a recession as compared with 1932. After that, however, there was a continued, if less spectacular improvement until in 1936 output totaled 54,000,000 pairs. Figures for the actual achievement in 1937 are not yet available, but it was estimated at 60,300,000 pairs, including 33,300,000 pairs of galoshes, 6,500,000 pairs of snow shoes, 19,700,000 pairs of rubber-soled canvas shoes, and 800,000 pairs other shoes. The increase in the output under the second five-year plan was almost entirely due to the phenomenal increase in the output of rubber-soled canvas shoes, which in 1936 was almost three times as high as in 1932, while the estimated output for 1937 was almost 3½ times as high. But a decrease of 20 to 25% was shown in

(*Continued on page 72*)

# Rubber Industry in Far East

## NETHERLAND INDIA

### Wages of Natives

Wages of native labor in industry and on estates in Netherland India, especially Java, have not kept pace with the rise in the cost of living. To be sure various rubber companies, chiefly in Sumatra, raised wages soon after the depreciation of the guilder brought greater prosperity, and other companies supplied coolies with rice at a reduced price; but the government is not satisfied that the large proportion of native laborers should still be receiving depression wages or wages but little better. The official index of native food costs showed in July, 1937, a gain of 19.3% over September, 1936, and the government has informed agricultural and industrial interests that it expects a commensurate increase in wages of the lowest paid workers, depending, of course, on local conditions. The government appreciates that the wage increase will have to be gradual, yet looks for a distinct improvement soon; otherwise it will act.

### High Latex Shipments

Final figures of rubber exports from Netherland India during October, 1937, total 34,986 metric tons. Java and Madura shipped 6,701 tons including 8,183 kilos of latex, besides 16,908 kilos in the form of tires. The tire exports are the highest in a long time. Estates in the Outer Provinces sent 13,704 tons, including 1,498,018 kilos of latex. In both September and October, 1937, heavy shipments of latex were made, the highest in at least a year. Natives exported 14,564,301 kilos, dry weight.

### Hevea Oil

In a recent issue of the *Alg. Landbouwweekblad* appears an illuminating article on experiments conducted with the extraction of oil from Hevea seed. Some years ago, when the market price of vegetable oils had fallen sharply and competition from Chinese manufacturers on the local market rendered a part of his factory idle, G. Meyer, owner of the Bandjaran Oil Factory, Kediri, Java, decided to press oil from Hevea seed. He succeeded in producing various samples of oil; the best, from the first pressing, was found on analysis to be practically identical in composition and qualities to good linseed oil and could be used for the same purposes; it was also about 15% cheaper. Two other qualities of oil were also obtained, one suitable for oiling leather goods, especially factory belting, and another for manufacturing soap. The waste could not be used as cattle food, but would serve as manure.

Mr. Meyer tried to secure the necessary government encouragement for work in this direction, but in vain; for various reasons officials were not in favor of fostering an industry which would oust the imported linseed oil. This was some years ago. However times have changed; the government is now encouraging new industries in Netherland India, and the time appears suitable for Mr. Meyer to try again. Efforts are being made to get sufficient backing; so the manufacture of Hevea oil may proceed on a commercial scale.

### Latex Cups

At the Chemical Laboratory, Buitenzorg, tests are being made to produce latex cups by a new method according to which a mixture of coconut fiber and latex is molded under pressure into the desired form. Production is said to be fairly simple, and as both the basic raw materials, coir and latex, are available here in abundance, the finished cups should be cheap. If these cups prove satisfactory, they may replace the aluminum cups now in universal use here and of which between 6,000,000 and 7,000,000 are imported annually. The new-style latex cups, although probably heavier than the aluminum ones, should offer the advantage of being neutral and therefore of being particularly useful on estates which ship much of their crop in latex form.

## SIAM

While the basic quota for Siam for 1938 as fixed by international agreement is 40,000 tons and Siam is allowed to export 100%, rubber producers here have applied for domestic quotas totaling 50,240 tons for 1938.

## CEYLON

Rubber exports for the first nine months of 1937 from Ceylon totaled 112,437,992 pounds, a considerable increase over the exports of the corresponding period of 1936, that is, 78,138,128 pounds. Most of the rubber went to United States as usual.

## MALAYA

### Production Statistics for Small Rubber Holdings

Production of small rubber holdings continued to increase during the third quarter of 1937, reaching the high total of 52,426 tons. For the first nine months of 1937 outputs were 138,010 tons, which exceeds the output for the whole of 1936 by more than 6,000 tons. This trend is reflected in the sharp decrease in the areas out of tapping. Whereas at the end of September, 1936, the total untapped area was 382,217 acres, or 32.8% of the total small holders' area, it dropped to 149,100 acres, or 11.7% of this total. The increase in tapping is held to be due in part to the decrease in the price of coupons and the consequent rise in the value of uncouponed rubber.

### Bud Grafting Among Natives

There is slowly growing interest in bud-grafting among the natives, especially in Johore where a number of applications have been received for bud-wood in the past two years. Reports indicate that these areas are progressing in a satisfactory manner. Some holdings in Perak South have also been budded recently and are said to be doing well too. The various methods adopted to help natives improve the quality of their sheet are gradually meeting with success. As soon as natives realize that they can make more money with the improved methods, they are willing enough to try them. Thus more smoke cabinets are being erected especially wherever a satisfactory premium for smoked sheet can be obtained.

### High-Yielding 30-Year Rubber

The annual report of the Sengat Rubber Estate, Ltd., presented by the Chairman Sir George Maxwell, at the twenty-seventh annual general meeting of the company makes interesting reading for what it has to say about some old rubber on the estate. The mature area on the estate is 1,708 acres, of which, on the average, 1,196 acres are tapped. The yield over the business year under review came to 592 pounds per acre, against 575 pounds and 534 pounds in the two preceding years respectively. The steady increase is said to be entirely due to resting. Some of

the rubber on the estate was planted between 1906 and 1910, that is to say, the rubber is between 27 and 31 years old, an age at which plantation rubber is frequently considered to be unprofitable. But this is what the visiting agent reported of four such old fields which together have an area of more than 200 acres:

"This again is magnificent rubber for its age. The majority of the trees have the vigor and appearance of first-class rubber planted in 1918, or, in other words, of rubber in its prime. There is tappable bark perfectly smooth on both sides of many trees, such is the rapidity of bark renewal. The knife-work has always been super-excellent. . . . There is no magic about this unusual longevity; it can only be directly ascribed to good soils and to exceptionally good management (which implies a sane tapping policy) over a long period of time."

Of another field, also planted in 1906-1910, he says, "Stand per acre 52 trees. The average yield per acre per month for the period July-February was 79¼ pounds. Daily yield per coolie averaged 19.1 pounds. Further comment would be superfluous."

Of course all of the old rubber on this estate does not make such a remarkable showing. But enough still gives comparatively high yields and promises many more good years of productivity, well above the average, in fact. Despite this fact, the management, with an eye to the future and in hope of something still better, has decided to cut out some of the less profitable fields and rejuvenate them, using up-to-date material. The first rejuvenation program covers 135 acres, of which 32 have already been replanted. A further 207 acres, selected for the second program, are being intensively tapped to get the utmost out of the trees before they are felled. For the third program, 230 acres may possibly be replanted.

In reading of the fine achievement of rubber close to 30 years old and over one cannot help remarking on what a truly wonderful tree Hevea is and how responsive it is to favorable conditions of soil and tapping; and it must be remembered that these trees were planted at a time when little or nothing was done about selection on a scientific basis. No wonder there are still planters in Malaya who hesitate to introduce budded rubber on their estates.

The company earned net profits of £15,133 during the past year and distributed a 7½% dividend.

In the latter part of his report Sir George Maxwell discussed shipments and absorption statistics and pointed out as encouraging signs, the increase in America in the manufacture of rubber goods other than tires, from 58,433 tons in 1931 to 104,525 tons in 1936, and also to the absorption of rubber in countries other than the United States and the United Kingdom, from 251,300 tons in 1931, to 363,108 tons in 1936.

# JAPAN

## Rubber Shortage

The restriction of rubber imports into Japan by the government, coupled with a rapid rise in demand, caused a serious shortage of raw rubber among medium and small-size rubber manufacturers. The Commerce and Industry Ministry accordingly "advised" the three large rubber concerns to share their stocks with the smaller firms, and the former, realizing that if they did not accept this advice, the Ministry would force them to surrender their stocks, voluntarily offered to help the others. Thus the crude rubber shortage has been solved for the present. The stocks amount to about 11,000 tons and are held by the Dunlop Rubber Co., Ltd., the Japan Rubber Co., Ltd., and the Yokohama Rubber Co., Ltd. (formerly the Goodrich branch plant). Of the total, some 1,250 tons (given up at the price of 72-73 sen,[1] or seven sen less than the big companies had paid at the time they stocked up) were to be distributed among 50 small rubber manufacturing companies belonging to the Japan Rubber Industry Federation.

This was early last November, when the three big companies stated they would consume 4,000 tons during the remainder of the year; they said they were willing to sell 5,000 tons out of their stock to the small companies, on condition that the Ministry permitted them to import an adequate amount of crude rubber in 1938. It was reported on November 15 that the Japanese Department of Commerce decided to restrict crude rubber imports to around 4,000 tons for the remainder of 1937.

## Export Figures

Japanese exports of rubber goods during the first nine months of 1937 were 31,452,000 yen, against 31,352,000 yen during the same period of the preceding year. In view of the very considerable drop in the exports of rubber-soled canvas shoes from 2,001,485 dozen pairs, value 11,299,000 yen, in the 1936 period to only 590,463 dozen pairs, value 3,597,000 yen, the final result is notable and also indicative of successful Japanese exertions in other directions. Indeed exports of most other goods showed increases, especially automobile tires which rose from 3,447,900 kin,[2] value 3,043,000 yen, to 4,674,000 kin, value 4,786,000 yen. Hose, belting, cord, together increased about 60%; exports of tennis balls nearly doubled, and baseballs were almost six times higher. Raincoats, rubber soles, water bottles are separately mentioned for the first time. On the other hand there was a sharp decline in exports of elastic webbing from 2,100,900 kin, value 1,653,000 yen, to 454,500 kin, value 639,000 yen, and of rubber hats (bathing caps?) from 135,834 dozen, value 246,000 yen, to 81,549 dozen, value 189,000 yen.

[1] Sen = $^1/_{100}$ yen; yen = $0.2905 (U. S. currency, Jan. 15).

[2] Kin = about 1⅓ lbs. avoirdupois.

# EGYPT

According to a decree of November 30, 1937, effective December 1, 1937, Egyptian duties on a variety of articles, including certain types of rubber footwear, have been increased. It is understood that the measure has been taken to protect infant industry and to increase public revenue.

# U. S. S. R.

(*Continued from page* 70)

the output of snow shoes in 1933, 1934, and 1935, as compared with 1932; however, this was made up in 1936 and 1937.

Since 1933 increasing amounts of synthetic rubber have been used in the footwear industry; in that year and in the following one the quantity of synthetic rubber so employed was still insignificant, having represented only 3.3% and 3.7% respectively of the total consumption of natural rubber by the industry; however by 1935 the proportion of synthetic rubber had risen to 21.5%, in 1936 to 36.9%; while 1937 was expected to show 75% synthetic rubber used in compounds for rubber footwear. It is a regrettable fact that the increase in the use of synthetic rubber in this industry has been largely at the expense of quality. But it is hoped that the planned reorganization of methods and the increased mechanization of processes will bring improvement here too. Meanwhile it must be said that so far advancement in mechanization has not been accompanied by any marked advancement in quality. Up to the end of 1936 only certain minor operations were mechanized. In 1937 notable progress was made in this direction, but complaints about the proportion of rejects grew too. The third five-year plan, which covers 1938-1942 inclusive, provides for an increasing rate of output so that the year 1942 will show production at least 2½ times as high as that of 1937. It is expected to accomplish this partly by means of a change in method, a complete changeover to molding being contemplated.

# CZECHOSLOVAKIA

The Czechoslovakian State Railway is said to be running two pneumatic-tired rail-cars experimentally.

# PORTUGAL

If negotiations with the Portuguese government are successfully concluded, the industrialist Carlos Farinha will erect a tire factory in Portugal. He must undertake to be ready to start operations within two years.

# Editor's Book Table

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### Tin Compounds in Rubber[1]

Stannic chloride or other tin compounds are being used as an intermediate reagent in the manufacture of rubber hydrochloride resins, transparent wrapping material, and rubber base pigments.

[1] From "Tin as a Chemical Raw Material" by B. W. Gonser, *Chem. Ind.*, Oct., 1937, p. 346.

# NEW PUBLICATIONS

**"The Neoprene Notebook."** Vol. 1, No. 1, Jan., 1938. E. I. du Pont de Nemours & Co., Inc., Wilmington, Del. 4 pages. This is the first issue of a new publication which is planned to give to the engineer and manufacturer engineering information, laboratory data, and application reports on Neoprene. The feature article of this issue is on "Vibration Dampening, Permanent Set and Thermal Conductivity Properties of Neoprene." Other subjects treated include discussions on the application of Neoprene to swing joints, hydraulic press gaskets, 1938 automobiles, and orange squeezers. Any reader of INDIA RUBBER WORLD who is interested in receiving copies of "The Neoprene Notebook" regularly can do so by sending his name and address to the du Pont company at Wilmington.

**"The Sporting Goods Dealer's Directory of the Sporting Goods Trade."** 1938 Edition. *The Sporting Goods Dealer,* St. Louis, Mo. 624 pages. Representing a comprehensive guide to the sources of supply of all types of sports equipment, this directory lists thousands of items of sports equipment and manufacturers. The volume also includes: sporting goods jobbers and wholesalers, classified by states; manufacturers' representatives and their lines; executive personnel of sporting goods trade associations; illustrated instructions on tennis racket stringing; governing bodies of organized sports in America; glossary of arms and ammunition terms; official dimensions of playing areas of 11 sports; and sporting goods importers.

**"Tag Celectray Pyrometers."** C. J. Tagliabue Mfg. Co., Park and Nostrand Aves., Brooklyn, N. Y. 28 pages. This catalog describes and illustrates Tag Celectray indicating, recording, and controlling pyrometers and resistance thermometers, which utilize a phototube, mirror galvanometer, and a beam of light.

**"Water-Tightness of Expansion Joint Materials in Concrete Roof Construction."** National Bureau of Standards, Washington, D. C. Seven pages. This paper, TIBM-55, contains information derived from tests on 36 proprietary joint fillers as applied to the problems of concrete roof construction. The materials investigated included: rubber latex; premolded types (sponge rubber, etc.); bitumens; rubber in flux; and oil mastics. The tests included: accelerated weathering; low temperature; high temperature; cycles of low temperature, soaking in water, and high temperature; and outdoor exposure. Copies are available from the Division of Codes and Specifications, National Bureau of Standards.

**"The Vanderbilt News."** Vol. 8, No. 1, Jan.-Feb., 1938. R. T. Vanderbilt Co., 230 Park Ave., New York, N. Y. 28 pages. This issue is devoted chiefly to Vanderbilt materials in Neoprene compounding and covers the following subjects: "Tabular Comparison of Properties—Neoprene and Rubber;" "Copper Contamination of Neoprene—Effect of AgeRite White;" "Neoprene Plasticizers—Reogen;" "Loading of Black Neoprene Compounds — P-33, Thermax;" "Loading of Non-Black Neoprene Compounds—Kalite, Dixie Clay;" and "Vulcanizing Neoprene without Zinc Oxide." Besides three other subjects are covered in this issue: "Thermax as a Means of Improving Heat Resistance of Rubber Compounds;" "Antioxidants in Medium Grade Rubber Compounds;" and "Butyl Zimate for Fast Curing Cements." Each discussion includes pertinent physical test data.

**"News about du Pont Rubber Chemicals."** E. I. du Pont de Nemours & Co., Inc., Wilmington, Del. Five enclosures are included with the du Pont news letter of January 12, 1938:

(1) "The Limitations of Rubber. I. Influence of Oxygen" by Arthur M. Neal. 12 pages. This is the first of a series of technical reports in which will be discussed various conditions that limit the utility of rubber and suggestions on how to overcome them. This first report deals with oxidation of vulcanized and unvulcanized rubber and discusses the effect of accelerators, antioxidants, and other materials on oxidation. In conclusion, results indicating the resistance of Neoprene to oxidation are given.

(2) "Rubber Chemicals Literature Index." 16 pages. Herein are indexed all of du Pont's 1937 reports in the 6- by 9-inch size and the older 9- by 11-inch reports which contain information of current interest.

(3) "Water Resistance of Neoprene" by H. W. Starkweather and H. W. Walker. 8 pages. Reprinted from *Ind. Eng. Chem.* Dec., 1937.

(4) "Softening Agents in Neoprene" by H. W. Starkweather and H. W. Walker. 8 pages. Reprinted from INDIA RUBBER WORLD. Dec., 1937.

(5) "Things Are Not What They Seem" by H. W. Magee. 20 pages. Reprinted from *Popular Mechanics.*

**"Hose Bulletin."** The Manhattan Rubber Mfg. Division of Raybestos-Manhattan, Inc., Passaic, N. J. In addition to showing many actual and unusual installations of hose being used in a wide range of different industries, this four-page illustrated folder contains helpful technical data and a detailed description of the types of construction of Manhattan hose.

**"Monsanto Current Events."** Monsanto Chemical Co., St. Louis, Mo. 34 pages. The December, 1937, issue of this house organ features the story of the formal acceptance by Monsanto of the 1937 Award for Chemical Engineering Achievement. Of interest to the rubber industry is a short article which discusses Monsanto's two groups of rubber antioxidants: the Flectols or ketone-amine group and the Santoflex group, condensation products of acetone and para-aminodiphenyl. Other subjects covered in this issue include: air transports, industrial problems of slime and algae control, and the pioneer in biochemistry, Emil Fischer.

**"Eye Hazards in Industrial Occupations."** Revised Edition. L. Resnick and L. H. Carris. National Society for the Prevention of Blindness, Inc., 50 W. 50th St., New York, N. Y. 249 pages. Illustrated. Price 50¢. This handbook, the contents of which are a valuable guide to safe practices in industry, will be found helpful to those responsible for industrial operations, whether owners, managers, or members of the operating staff, and for the many others who share the responsibilities and opportunities for conserving the life, health, and sight of the men, women, and children employed in industry.

**"Current Titles."** Published monthly by Current Titles from Engineering Journals, 928 Broadway, New York, N. Y. The first issue of this new monthly periodical appeared in October. Each month this publication will list the table of contents of the outstanding English-language periodicals of the current month in the fields of engineering, chemistry, physics, geology, and technology. Under the latter heading will be included selected industrial journals. Editing of tables of contents is confined to the elimination of titles of extraneous and non-technical matter. "Current Titles" is intended to provide a time-saving means for directing technical reading. To facilitate reference work an annual cumulative index will be issued as a supplement to the regular monthly publication.

**"List of Inspected Gas, Oil, and Miscellaneous Appliances."** December, 1937. Underwriters' Laboratories, Inc., Chicago, Ill. 127 pages. This list, which is revised semi-annually, includes: gasoline hose of the rubber-metal and synthetic rubber types, sheet packing for use with hazardous liquids, millinery cement made of rubber dissolved in carbon tetrachloride and benzene, and carbon black.

(*Continued on page 78*)

# Patents and Trade Marks

## MACHINERY

### United States

2,103,134. **Coated Insulated Wire Apparatus.** T. Akahira, Takinogawa-ku, assignor to Z. H. Rikagaku Kenkyujo, both of Tokyo, Japan.
2,103,860. **Mold.** H. Mazzeo, Buenos Aires, Argentina.
2,105,316. **Tire Cutter.** H. J. Fleming, assignor to Bendix Products Corp., both of South Bend, Ind.

### Dominion of Canada

370,833. **Rubber Thread Apparatus.** Easthampton Rubber Thread Co., assignee of K. R. Shaw, both of Easthampton, Mass., U. S. A.
370,973. **Tire Spreader.** Bishman Co., assignee of W. A. Bishman, both of Minneapolis, Minn., U. S. A.
371,138. **Sheathing Apparatus.** Dominion Rubber Co., Ltd., Montreal, P. Q., assignee of C. W. Short, E. Providence, R. I., U. S. A.

### United Kingdom

471,754. **Electric Vulcanizers.** A. L. Wallace.
472,007. **Tire Molds.** M. and R. Baudou and J. Brunswick.
472,707. **Vulcanizing Presses.** A. H. Stevens (R. S. Allen).
473,327. **Vulcanizer.** A. L. Wallace.
473,611. **Mold.** Romika Schuhfabrik A.G.

### Germany

653,800. **Method and Device to Make Hollow Goods.** Continental Gummi-Werke A.G., Hannover.
654,724. **Device and Method to Make Rubber Thread.** International Latex Processes, Ltd., St. Peter's Port, Channel Islands. Represented by C. and E. Wiegand, both of Berlin.
654,864. **Device and Method to Make Rubber Threads.** H. Ziegner, Hagen, Westphalia.

## PROCESS

### United States

20,617. (Reissue). **Shoe Sole.** J. R. Caldwell, assignor to Firestone Tire & Rubber Co., both of Akron, O.
2,102,689. **Rubber Bands.** A. T. Fischer, Cleveland Heights, O.
2,102,741. **Treating Vulcanized Rubber.** F. N. Pickett, London, England, assignor to United States Rubber Products, Inc., New York, N. Y.
2,102,784. **Wear Indicating Tire.** K. L. Bridges, assignor to Socony-Vacuum Oil Co., Inc., both of New York, N. Y.
2,102,804. **Applying Protective Coatings to Shoes.** C. Miller, Long Island City, N. Y., I. G. Miller, executrix of said C. Miller, deceased.
2,102,838. **Thermoplastic Compositions Containing Rubber.** E. R. Dillehay, Glen Ellyn, Ill., assignor to Richardson Co., Lockland, O.
2,102,949. **Making and Applying Bottle Caps.** J. R. Gammeter, assignor of one-half to S. G. Gammeter, both of Akron, O.
2,103,157. **Rubber Soled Footwear.** B. Jaumandreu, Buenos Aires, Argentina.
2,103,841. **Insulating Conductors.** J. F. Calvert, Ames, Iowa, assignor to Westinghouse Electric & Mfg. Co., E. Pittsburgh, Pa.
2,103,884. **Shoes.** P. J. Wentworth, Ft. Thomas, Ky.
2,104,069. **Treating Chlorinated Rubber Solutions.** J. P. Baxter, Widnes, T. N. Montgomery, Lancaster, and J. G. Moore, Runcorn, all in England, assignors to Imperial Chemical Industries, Ltd.
2,104,228. **Lasting Footwear.** J. S. Kamborian, W. Newton, assignor to Northern Machine Co., Inc., Boston, both in Mass.
2,104,358. **Rubber Solutions.** J. Treboux, assignor to firm J. R. Geigy, A. G., both of Basel, Switzerland.
2,105,361. **Compounds of Polymerized Acrylic Acid or Its Esters with Sulphur or Selenium.** P. Nowak, Berlin-Charlottenburg, Germany, assignor to General Electric Co., Schenectady, N. Y.

### Dominion of Canada

370,858. **Rubber Dispersion Concentrating Method.** "Semperit" Oesterreichisch-Amerikanische Gummiwerke A.G., assignee of W. Pauli and P. Stamberger, co-inventors, all of Vienna, Austria.
370,935. **Rubber Product.** T. L. Shepherd, London, England.
370,936. **Thread, Filament or Yarn Production.** T. L. Shepherd, London, England.
371,029. **Belt Manufacture.** Wingfoot Corp., Wilmington, Del., assignee of E. G. Kimmich, Akron, O., U. S. A.
371,139. **Electric Cables.** Dominion Rubber Co., Ltd., Montreal, P. Q., assignee of C. W. Short, E. Providence, R. I., U. S. A.
371,225. **Molding Rubber.** H. Malm, New York, N. Y., U. S. A.

### United Kingdom

471,899. **Forming Aqueous Dispersions of Rubber into Foam.** Dunlop Rubber Co., Ltd., E. A. Murphy, E. W. Madge, S. D. Taylor, and D. W. Pounder.
472,118. **Fibrous Plastic Compositions.** G. W. Beldam.
472,193. **Porous Hard Rubber.** Dunlop Rubber Co., Ltd., D. F. Twiss, and R. W. Hale.
472,349. **Extruding Artificial Filaments.** United States Rubber Products, Inc.
472,646. **Sponge Rubber.** H. R. Minor.
472,671. **Vulcanizing Rubber.** R. A. Dufour and H. A. Leduc.
472,912. **Creaming Rubber Latex.** California Fruit Growers Exchange.
472,990. **Absorption under Stretch.** International Latex Processes, Ltd.
473,039. **Sponge Rubber.** Firestone Tire & Rubber Co., Ltd.
473,297. **Making Gas Expanded Rubber.** F. W. Peel.

### Germany

652,160. **Making Hose.** Auto Union A.G. Chemnitz.
654,128. **Attaching Rubber to Rigid Surfaces.** Metallgesellschaft A.G., Frankfurt a.M.
654,217. **Treating Old Rubber.** Lehmann & Vos & Co., Hamburg.
655,008. **Treating Belting.** I. G. Farbenindustrie A.G., Frankfurt a.M.

## CHEMICAL

### United States

2,102,595. **Coating Composition.** M. V. Hitt, Wilmington, Del., and D. G. Kennedy and H. L. Priddy, both of Parlin, N. J., assignors to E. I. du Pont de Nemours & Co., Wilmington, Del.
2,102,621. **Accelerator.** R. C. Goodwin, Lubbock, Tex., and A. W. Sloan, Akron, O.; said Sloan assignor to B. F. Goodrich Co., New York, N. Y.
2,103,186. **Chlorinated Rubber Coating Composition.** J. M. Schantz, assignor to Hercules Powder Co., both of Wilmington, Del.
2,103,188. **Antioxidant.** W. L. Semon, Silver Lake, and R. V. Yohe, Cuyahoga Falls, both in O., assignors to B. F. Goodrich Co., New York, N. Y.
2,103,461. **Vulcanizing Agent.** A. L. Hock, A. Kirkham, and H. Spence, assignors to P. Spence & Sons, Ltd., all of Manchester, England.
2,103,686. **Rubber Preservative.** G. D. Martin, Nitro, W. Va., assignor, by mesne assignments, to Monsanto Chemical Co., Wilmington, Del.
2,103,749. **Accelerator.** W. P. ter Horst, Silver Lake, O., assignor to United States Rubber Co., New York, N. Y.

### Dominion of Canada

370,692. **Rubber Preservatives.** Monsanto Chemical Co., St. Louis, Mo., assignee of R. L. Sibley, Nitro, W. Va., both in the U. S. A.
370,993. **Accelerators.** Dunlop Tire & Rubber Goods Co., Ltd., Toronto, Ont., assignee of D. F. Twiss and F. A. Jones, co-inventors, both of Birmingham, England.
371,030. **Antioxidants.** Wingfoot Corp., Wilmington, Del., assignee of W. Scott, Akron, O., both in the U. S. A.
371,143. **Rubber and Metal Adhesive.** Firestone Tire & Rubber Co. of Canada, Ltd., Hamilton, Ont., assignee of B. J. Humphrey, Akron, O., U. S. A.
371,203. **Rubber-Cement Composition.** G. P. Davis, Sydney, N. S. W., Australia.
371,205. **Rubber Composition.** G. P. Davis, Sydney, N. S. W., Australia.

### United Kingdom

471,277. **Latex-Cement Compositions.** C. F. Burgess Laboratories, Inc.
471,637. **Coating Composition.** Naamlooze Vennootschap De Bataafsche Petroleum Maatschappij.
471,818. **Chlorinated Rubber Treatment.** L. W. Hardt and Imperial Chemical Industries, Ltd.
472,001. **Dispersing Agents.** Imperial Smelting Corp., Ltd.
472,319. **Bonding Agents for Rubber and Synthetic Rubber.** B. J. Habgood, L. B. Morgan, and Imperial Chemical Industries, Ltd.
472,653. **Softeners.** A. Carpmael, (I. G. Farbenindustrie A.G.).
472,685. **Synthetic Rubber Shoe Compositions.** United Shoe Machinery Corp.
473,153. **Chlorinated Rubber Coating Compositions.** N. Pal and Palsales, Ltd.
473,158. **Coating Surfaces.** N. Pal and Palsales, Ltd.
473,287. **Ebonite.** Research Association of British Rubber Manufacturers, B. D. Porritt, J. R. Scott, and W. H. Willott.
473,302. **Compositions for Laminated Springs.** T. H. Thompson.
473,329. **Coating Composition for Rubber.** Deutsche Hydrierwerke A.G.
473,424. **Polynuclear Coloring Compounds.** G. W. Johnson (I. G. Farbenindustrie A.G.).
473,496. **Paper Coating Compositions.** O. Weissberger and F. Polak, (trading as Auerbach, Weissberger A Spol.).
473,516. **Chlorinated Rubber Compositions.** N. Pal and Palsales, Ltd.

## GENERAL

### United States

20,609. (Reissue). **Shoe.** E. W. Dunbar, Hudson, assignor to Cambridge Rubber Co., Cambridge, both in Mass.
2,102,601. **Golf Overshoe.** G. E. Murber, San Francisco, Calif.
2,102,658. **Window Channel.** A. Weisenburg, assignor to Crown Cork & Seal Co., Inc., both of Baltimore, Md.
2,102,665. **Pump.** H. Allen, assignor, by mesne assignments, to Abercrombie Pump Co., both of Houston, Tex.
2,102,673. **Gasket.** M. J. Brown, Niagara Falls, N. Y.
2,102,688. **Sole Presser.** S. J. Finn, Beverly, Mass., assignor to United Shoe Machinery Corp., Paterson, N. J.
2,102,690. **Article Holder.** A. T. Fischer, Cleveland Heights, O.
2,102,739. **Fish Bait.** F. J. Peters, Portland, Ore.
2,102,801. **Garment.** S. W. Kunstadter, assignor to Formfit Co., both of Chicago, Ill.
2,102,958. **Infant's Bathtub.** B. H. Kennedy, Rochester, N. Y.
2,102,959. **Infant's Bathtub.** D. M. Kennedy, Rochester, N. Y.
2,102,985. **Scalp Loosener.** J. Wadel, Hamburg, Germany.
2,103,003. **Composition Strip.** A. C. Fischer, Chicago, Ill.
2,103,011. **Tire Deflater.** J. V. McMahon, Ness City, Kan.
2,103,133. **Elastic Fabric and Garment.** P. Adamson, Rye, assignor to United States Rubber Co., New York, both in N. Y.
2,103,148. **Baseball Base.** G. H. Conrad, Great Bend, Pa.
2,103,154. **Vacuum Cleaner.** E. Faber, Stuttgart, Germany.
2,103,174. **Surgical Instrument.** V. M. Posada, San Salvador, El Salvador.
2,103,245. **Rubberized Product.** E. G. Budd, assignor to Edward G. Budd Mfg. Co., both of Phladelpha, Pa.
2,103,401. **Animal Poking Implement.** A. S. Bailey, Albert Lea, assignor of one-half to J. P. Donahue, Twin Lakes, both in Minn.
2,103,425. **Faucet Attachment.** C. E. Lehman, Chicago, Ill.
2,103,579. **Elastic Band.** E. Gluck, Burkhardtsdorf, Germany.
2,103,584. **Cowtail Garter.** M. Jamba, Stamford, N. Y.
2,103,625. **Hosiery.** W. J. Longtin, assignor to Infant Socks Co., both of Reading, Pa.
2,103,662. **Cigarette Holder.** E. O. Brower, Philadelphia, Pa.
2,103,699. **Fountain Pen Cleaner.** J. D. Sheehan, Brooklyn, N. Y.
2,103,718. **Horseshoe.** J. A. Goodwin, Lexington, Ky.
2,103,822. **Tire Valve.** I. D. Perry, Muskegon, Mich.
2,103,838. **Hose Coupling.** A. M. Bach, Palo Alto, Calif.
2,103,863. **Visor Construction.** W. O. Meller, Monroe, assignor to Woodall Industries Inc., Detroit, both in Mich.
2,103,886. **Swimming Cap.** W. P. Barnes, Chicago, Ill.
2,103,949. **Scalp-Treating Device.** M. E. Koehler, Washington, D. C.
2,103,973. **Windshield Wiper.** E. C. Horton, Hamburg, assignor to Trico Products Corp., Buffalo, both in N. Y.
2,104,016. **Respiratory Device.** W. P. Biggs, Washington, D. C.
2,104,031. **Container.** C. L. Graber, Lakewood, O.
2,104,149. **Fly Swatter.** C. L. Bell, assignor to Lubbers & Bell Mfg. Co., both of Clinton, Iowa.
2,104,203. **Girdle.** S. Levy, assignor to J. Hoffman, San Francisco, Calif.
2,104,277. **Corset.** C. H. Schopbach and L. Babcock, assignors to International Corset Co., both of Aurora, Ill.
2,104,287. **Trousers Support.** H. P. Beck, Lake City, Minn.
2,104,532. **Nonskid Tire.** R. Sommer, Berlin, Germany, assignor of one-half to W. S. Bleistein, New York, N. Y., and one-fourth to B. Cossalter, Feltre (Belluno), Italy.
2,104,583. **Sole.** C. L. Daly, Belmont, assignor to Daly Bros. Shoe Co., Inc., Boston, both in Mass.
2,104,704. **Flask.** C. L. Graber, Lakewood, O.
2,104,758. **Controller of Distribution and Pressure of Body Fluids.** J. R. Poppen, United States Navy.
2,104,910. **Rug Marker.** S. C. Simonski, Philadelphia, Pa.
2,104,924. **Heel.** G. Dellea, Detroit, Mich.
2,104,943. **Bathing Suit.** S. d'Achon, assignor to La Societe a Responsabilite Limitee dite "Irmone," both of Paris, France.
2,105,168. **Cable.** H. A. Staples, Plainfield, N. J., assignor to Phelps Dodge Copper Products Corp., New York, N. Y.
2,105,170. **Nipple.** R. C. Tarrant, Port Washington, N. Y.
2,105,200. **Surgical Pump.** H. G. Phelps, Milwaukee, Wis.
2,105,215. **Shear.** R. W. Dinzl, Narberth, Pa., assignor to Baldwin-Southwark Corp., a corporation of Del.
2,105,257. **Stiffening Rib for Supporting Garments.** J. V. Moore, assignor to Moore Fabric Co., both of Pawtucket, R. I.
2,105,335. **Footwear.** P. Y. Smiley, Kitchener, Ont., Canada, assignor to B. F. Goodrich Co., New York, N. Y.
2,105,362. **Electrical Conductor.** P. Nowak and H. Hofmeier, Berlin-Charlottenburg, Germany, assignors to General Electric Co., Schenectady, N. Y.
2,105,379. **Amusement Device.** L. H. Smith, Murrells Inlet, S. C.
2,105,417. **Waist Band Fastener.** H. Herrle, New Orleans, La.
2,105,436. **Bow.** G. Flatto, assignor to Ribbon Mills Corp., both of New York, N. Y.

### Dominion of Canada

370,646. **Joint.** H. C. Lord, co-inventor with and assignee of T. Lord, both of Erie, Pa., U. S. A.
370,687. **Coated Sheet Material Manufacture.** Marathon Paper Mills Co., Rothschild, assignee of A. Abrams and G. W. Forcey, both of Wausau, and R. A. Farrell, Neenah, co-inventors, all in Wis., U. S. A.
370,737. **Tire Inflater.** H. C. Crandall, Kansas City, Kan., U. S. A.
370,741. **Life Saving Garment.** J. J. Evans, London, England.
370,847. **Coated Sheet Material Making Machine.** Marathon Paper Mills Co., Rothschild, assignee of A. Abrams, Wausau, and C. L. Wagner, Rothschild, co-inventors, both in Wis., U. S. A.
370,862. **Cable.** Simplex Wire & Cable Co., Cambridge, assignee of W. N. Eddy, Belmont, both in Mass., U. S. A.
370,875. **Pessary.** W. K. McCormick, Walkerville, and M. A. Stein, co-inventors, and W. B. Jenkins, assignee of one-third of the interest, both of Windsor, all in Ont.
370,879. **Hair Waving Appliance Cord.** W. T. Dodds, co-inventor, and Shanks-Dodds Co., assignee of J. A. Hashek, co-inventor with the said W. T. Dodds, all of Toronto, Ont.
370,892. **Anti-Skid Device.** E. C. Armstrong, Sr., Pittsburgh, Pa., U. S. A.
370,902. **Windscreen Wiper.** W. Dudley, Redditch, Worcestershire, England.
370,930. **Liquid Bag.** A. Richards, Providence, R. I., U. S. A.
370,943. **Tire and Rim.** E. E. Wittkopp, Chicago, Ill., U. S. A.
370,970. **Explosive Wrapping.** Atlas Powder Co., Wilmington, Del., assignee of M. Brandt, Tamaqua, Pa., both in the U. S. A.
370,979. **Electrical Conductor.** Canadian General Electric Co., Ltd., Toronto, Ont., assignee of J. G. E. Wright, Alplaus, New York, N. Y., U. S. A.
371,036. **Printing Member.** V. M. Stacy-Bush, Rochester, N. Y., assignee of E. I. Chadwick, Smethport, Pa., executrix of the estate of C. A. Baker, deceased, in his lifetime of Rochester, and assignee of R. E. Bircher, trustee in Bankruptcy of

Parazin Printing Plate, Inc., assignee of S. A. Danser, all of Rochester, N. Y., all in the U. S. A.
371,038. **Shoe.** A. J. Brauer, Webster Groves, and F. P. Wagner, St. Louis, co-inventors, both in Mo., U. S. A.
371,046. **Hair Tinter.** T. F. Callaghan, Toronto, Ont.
371,049. **Tire.** R. L. Durham, Buena Vista, Va., U. S. A.
371,052. **Shoulder Pad.** S. Frais, London, England.
371,140. **Resilient Mounting.** Dominion Rubber Co., Ltd., Montreal, P. Q., assignee of W. C. Keys, Detroit, Mich., U. S. A.
371,144. **Footwear.** B. F. Goodrich Co., New York, N. Y., U. S. A., assignee of P. Y. Smiley, Kitchener, Ont.
371,148. **Bathing Suit.** International Latex Processes, Ltd., St. Peter's Port, Channel Islands, assignee of J. J. Galligan, Providence, R. I.

### United Kingdom

470,231. **Gill Drawing Frames.** W. Holdsworth.
470,629. **Saddles.** F. Vetter.
470,697. **Seats.** G. G. Barker, (Bendix Aviation Corp.).
470,964. **Motor Vehicle Air-Pumps.** H. B. Russell.
471,028. **Boxes.** G. W. Peacock.
471,107. **Dart Boxes.** V. T. Salter.
471,151. **Petrol Tank Closures.** D. Walker and F. J. Marles.
471,161. **Bottle Boxes.** G. Madden.
471,221. **Baths.** G. Missiroli.
471,248. **Vacuum Closures for Tin Boxes.** R. Barlow, A. F. Cowan, and J. Worthington.
471,275. **Loom Shuttles.** Premier Waterproof & Rubber Co., Ltd., and S. Ridings.
471,355. **Saddle Covers.** R. A. Hardgrave and W. Jerrett.
471,432. **Composite Boards.** G. C. Tyce, V. Lefebure, and Imperial Chemical Industries, Ltd.
471,446. **Packages.** Novocol Chemical Mfg. Co., Inc.
471,472. **Spring Cycle Frames.** Getefo Ges. für Technischen Fortschritt.
471,477. **Non-Slipping Device for Ladders.** A. V. House.
471,574. **Hat Making Machines.** V. Bohm.
471,607. **Milk Cartons.** Utility Cartons, Ltd., and L. B. Holman.
471,638. **Containers for Cooling Meat.** J. A. C. A. Hoveman.
471,789. **Rubber Springs.** Auto Union A.G.
471,954. **Flexible Tubes.** C. Freudenberg Ges.
471,956. **Bracket Tables.** E. B. Openshaw.
471,960. **Temperature-Responsive Actuating Elements.** L. Paillart and Etablissements M. Houdaille.
472,023. **Tires.** H. Simon, Ltd.
472,034. **Couplings.** A. F. and A. F. Flender, and F. Tangerding, (trading as A. F. Flender & Co.).
472,037. **Cricket Bat Handles.** W. Sykes, Ltd., and P. Arundel.
472,063. **Compound Sheet Materials.** Pirelli-General Cable Works, Ltd., and P. Pillon.
472,074. **Friction Grips.** J. Wilson.
472,091. **Surgical Syringe Ampoules.** V. Monnier.
472,119. **Toys.** Premo Rubber Co., Ltd., and A. Levy.
472,222. **Toothbrushes.** A. Reissner.
472,237. **Golf-Practising Devices.** B. V. Radley.
472,247. **Apparatus for Massage and Liquid Treatment of the Colon.** H. E. Dierker.
472,282. **Hair Waving Appliances.** Marchant, Hills & Co., Ltd.
472,350. **Erasers.** Eagle Pencil Co.
472,355. **Powder Blowers.** C. R. Theiler.
472,358. **Bands to Hold Wearing Apparel.** A. Meineke.
472,364. **Vaginal Douches.** V. Melini.
472,369. **Fluid-Actuated Valves.** J. H. Ewart.
472,372. **Paper Folders.** Brehmer, Geb.
472,414. **Plaster Casts.** W. F. Comyns and G. S. Chapman.
472,445. **Pressure Chambers.** W. Kohne.
472,499. **Floors.** A. G. MacDonald.
472,507. **Insulators.** G. MacLellan & Co., Ltd., and W. Grey.
472,515. **Rollers.** W. E. Evans (Olympia Buromaschinenwerke A.G.).
472,550. **Centrifugal Pumps.** G. A. H. Grierson.
472,558. **Heel Pads.** Phillips Rubber Soles, Ltd., and G. F. Eyles.
472,569. **Resilient Mountings.** United States Rubber Products, Inc.
472,672. **Lay Figures.** F. C. Lawrence.
472,616. **Vehicle Bodies.** A. Dubonnet.
472,635. **Fire-Hyrant Cover Plates.** J. Leadbeater, and G. W. E. Trigg.
472,676. **Vacuum Cleaners.** Naamlooze Vennootschap Radiofabriek & Ingenieursbureau Voorheen Van Der Heem & Bloemsma.
472,702. **Spray Producers.** G. M. G. Jones.
472,768. **Cameras.** A. Isherwood.
472,796. **Apparatus for Offset-Printing.** I. Hakogi.
472,807. **Vibration Dampers.** Daimler-Benz A.G.
472,824. **Surgical Irrigation Appliances.** S. Seidner.
472,836. **Shock Absorbers.** J. Lucas, Ltd., and H. W. Pitt.
472,897. **Gas Masks.** J. Nicolaidi.
472,939. **Wheels.** Dunlop Rubber Co., Ltd., W. E. Hardeman, and R. F. Daw.
472,954. **Boots.** United States Rubber Products, Inc.
472,955. **Footwear.** United States Rubber Products, Inc.
473,052. **Tires.** Firestone Tire & Rubber Co., Ltd.
473,079. **Wheels.** Dunlop Rubber Co., Ltd., C. E. Goodyear, and G. E. Sharp.
473,084. **Hydraulic Apparatus.** Dunlop Rubber Co., Ltd., J. Wright, and H. Trevaskis.
473,093. **Well Pipe Plugs.** Hydrill Co.
473,112. **Well Drilling Tools.** J. A. Zublin.
473,218. **Valves.** H. C. Brinkers.
473,228. **Rain Covers for Hats.** J. McHale.
473,231. **Skis.** L. E. Rapin.
473,249. **Tire Deflation Indicators.** H. Rasmussen.
473,261. **Centrifugal Separators.** Aktiebolaget Separator.
473,286. **Soles and Heels.** E. W. Coleman.
473,296. **Windscreen Cleaners.** J. Lucas, Ltd., and O. Lucas.
473,306. **Articulated Vehicles.** Maxwell, Manners & Pring, Ltd., and E. C. S. Croxson.
473,375. **Valves.** H. P. Bulmer & Co., Ltd., H. E. Durham, and V. Beach-Thomas.
473,399. **Boot Protectors.** J. Delclos-Mollera.
473,405. **Saddles.** F. Vetter.
473,413. **Footwear.** Continental Gummi-Werke A.G.
473,519. **Vehicles.** M. Mackenzie.
473,620. **Elastic Valves.** H. S. Hughes.
473,841. **Rotary Plug Valves.** P. K. Saunders.

### Germany

654,920. **Hosiery.** F. Anton, Zeulenroda, Thuringia.
654,995. **Glove.** F. Bruggemann, Munich.
655,072. **Tire.** Deutsche Dunlop Gummi-Co. A.G., Hanau a.M.

## TRADE MARKS

### United States

352,960. Double circle containing the words: **"Herco Hercules Company Philadelphia."** Hose. Hercules Co., Philadelphia, Pa.
352,962. Double diamond containing the letter **"S."** Rubber and rubberized clothing. H. A. Greene, doing business as M. L. Snyder & Son, Philadelphia, Pa.
353,065. **Gates.** Batteries and casings. Gates Rubber Co., Denver, Colo.
353,086. Label containing the word **"Standwear."** Tires. Delco Tire Corp., Chicago, Ill.
353,132. **Eberhard Faber.** Rubber bands and erasers. Eberhard Faber Pencil Co., Brooklyn, N. Y.
353,220. Winged inner tube and the letters **"G & J."** Tires and inner tubes. United States Rubber Products, Inc., New York, N. Y.
353,242. Label containing the word **"Winner."** Water sports equipment. Winner Mfg. Co., Inc., Trenton, N. J.
353,254. **Glorifier.** Corsets, girdles, etc. H. W. Gossard Co., Chicago, Ill.
353,293. **Admiral.** Water sports toys. United States Rubber Products, Inc., New York, N. Y.
353,294. **Commander.** Water sports toys. United States Rubber Products, Inc., New York, N. Y.
353,295. **Middie.** Water sports toys. United States Rubber Products, Inc., New York, N. Y.
353,296. **Water Wiggler.** Water sports toys. United States Rubber Products, Inc., New York, N. Y.
353,297. **Ensign.** Water sports toys. United States Rubber Products, Inc., New York, N. Y.
353,308. Label containing the words: **"Tuff Tred."** Rubber in strip form for manufacturing and repairing tires. Oliver Tire & Rubber Co., Oakland, Calif.
353,337. Oval with representation of a dog containing the word **"Greyhound."** Batteries. McCreary Tire & Rubber Co., Indiana, Pa.
353,392. Label containing the words: **"Performite Wires & Cables Safety Uniformity Long Life Dependability."** Wires and cables. Okonite Co., Passaic, N. J.
353,400. **Air-Speed.** Tires and tubes. Pharis Tire & Rubber Co., Newark, O.
353,401. **J-1.** Tires and tubes. Pharis Tire & Rubber Co., Newark, O.
353,412. **Criterion.** Sanitary belts. Slote & Klein, Inc., New York, N. Y.

353,539. **Superball.** Footballs, basketballs, soccer balls, etc. Ricardo Bonani E Hijos, Bell Ville, Cordoba, Argentina.
353,576. Representation of two diamonds and a wreath with the letter **"G"** between them. Automobile heaters. B. F. Goodrich Co., New York, N. Y.
353,633. Representation of a skeleton holding a sign containing the words: **"When You Drive Without Sleetex In A Winter Storm Death Takes A Seat In Your Car!"** Windshield wipers. Sleetex Co., Inc., New York, N. Y.
353,637. **Xcel.** Tires and tubes. Pure Oil Co., Chicago, Ill.
353,659. **Perfotex.** Rubberized fabrics. Archer Rubber Co., Milford, Mass.
353,701. **Sport-Back.** Suspenders. Condor Products, Inc., Buffalo, N. Y.
353,707. **Windsor Hickok.** Garters. Hickok Mfg. Co., Inc., Rochester, N. Y.

## EAST AND SOUTH

*(Continued from page 62)*

now have the oil and gasoline risks, the electrical hazard, the pyroxylin plastic risk and the fire hazard brought about by the introduction of scores of new solvents for all sorts of purposes.

"It is only a century and a half ago that Lavoisier, by a series of brilliant experiments, gave to the world an inkling of what fire really is. Modern science defines fire as the combustion or rapid oxidation of a substance at or above its kindling point. This gives us valuable information regarding fire extinguishment—either cool the burning material below its kindling point, or exclude the oxygen of the air from contact with the burning substance. All modern fire fighting methods are based upon the application of one or the other of these two principles or upon a combination of both. . . .

"There are four types of extinguishing materials developed . . . for special uses. The liquid vaporizing extinguisher is especially recommended for fires in automobiles, motor trucks, and is adapted for putting out fires in oils and greases and in electrical machinery. The chemical solution type is most efficient for fires in free burning materials such as wood, textiles, rubbish, etc. The foam extinguisher is highly recommended for two types of fire, those in free burning materials and those in oils and greases. The inert gas type of extinguisher is recommended for fires in electrical machinery and also for oil and grease fires and for automobiles and motorboats."

**Dr. B. J. Lemon,** formerly located in Washington, D. C., as special representative of the Tire Department, United States Rubber Products, Inc., has been transferred to 1790 Broadway, New York, N. Y., where as a member of the New Products Department he will act as head of the Technical Section.

**Rubberset Co.,** 630 Fifth Ave., New York, N. Y., manufacturer of rubber brushes, announced for its Pacific Coast division the largest year in total sales volume in the history of its business along with the addition of many new outlets for the Rubberset line of painters' tools. Lloyd R. Green, manager of the division, recently came East for a conference with factory executives.

**The American Toy Fair** will be held April 25 to May 7 under the auspices of the Toy Manufacturers of the U. S. A., Inc., 200 Fifth Ave., New York, N. Y., and temporary exhibits for those firms which do not have New York showrooms will be at the Hotel McAlpin.

## NEW PUBLICATIONS

*(Continued from page 74)*

**"Statistical Classification of Domestic Commodities Exported from the United States. Schedule B."** United States Department of Commerce, Bureau of Foreign and Domestic Commerce, Washington, D. C. 127 pages. This revised edition of Schedule B, which became effective January 1, 1938, classifies articles for export which are the growth, produce, or manufacture of the United States and articles of foreign origin which have been changed in form and enhanced in value by labor or manufacture in the United States. Each article is classified in its proper group and is listed with its economic class, code, and commodity numbers. Also, each listing specifies the unit of quantity to be used for export declaration. Customs officers have been instructed not to accept export declarations when the commodity details are not in accord with Schedule B, which may be secured from the Superintendent of Documents, Washington, D. C., for 30¢.

**"Functions of the Personnel Director."** Policyholders Service Bureau, Metropolitan Life Insurance Co., New York, N. Y. 38 pages. The material in this booklet is based on a survey of present methods of handling industrial relations in 80 companies, both large and small. In addition to outlining and interpreting the personnel functions, the study describes the personnel programs of the contributing companies, discusses the importance of the personnel director in the business organization, and tells how many personnel departments have been organized.

## BOOK REVIEWS

**"The Chemistry of Petroleum Derivatives."** Carleton Ellis. Published by Reinhold Publishing Corp., 330 W. 42nd St., New York, N. Y. 1937. Cloth, 6 by 9 inches, 1464 pages. Illustrated. Index. Price $20.

The present volume continues the subject matter of Volume I, which was published in 1934, on the chemistry of petroleum derivatives and contains, in some cases, additional references to the work published prior to that date. The purpose of this work is to form a comprehensive record of the work done in this field. The voluminous character of the book gives an indication of the activity of the petroleum chemist since 1934, and the book contains much recent material of importance on such subjects as: the utilization of by-products of refining, polymerization, detonation, nitration, and thermodynamics.

While the book is devoted essentially to the petroleum industry, there is considerable material pertaining to the chemistry of rubber and related materials. One chapter is concerned with the carbon black industry, wherein is discussed the various processes of producing this material, and the physical and chemical properties of the various types of blacks. Also treated in this chapter are the industrial applications and the evaluation of the carbon blacks. A number of pages deal with the polymerization of butadiene and chloroprene in the production of synthetic rubber. In addition are many other references to rubber chemistry scattered throughout the book. The volume contains a name index as well as a subject index.

**"Handbook of Chemistry and Physics."** Twenty-second Edition, 1937. Chas. D. Hodgman, Editor-in-Chief. Published by Chemical Rubber Publishing Co., Cleveland, O. Fabrikoid, 2,090 pages, 4¼ by 6 7/8 inches. Indexed. Price $6.

The most recent issue of this handbook, for 24 years an authoritative reference work in chemistry, physics, mathematics, engineering, and related sciences, contains data prepared by 173 specialists and includes over 150 pages of new composition. The handbook is conveniently divided into five sections, each section being indicated by an insert of stiff colored paper on which is printed the contents of the section. The divisions follow: 1. Mathematical Tables; 2. Properties and Physical Constants; 3. General Chemical Tables, Specific Gravity Tables, and Properties of Matter; 4. Heat and Hygrometry, Sound, Electricity and Magnetism, and Light; 5. Quantities and Units—Miscellaneous. New and revised data in this edition include material under the following headings: gravimetric factors, preparation of solutions and reagents, transmission of filters, viscosity, relative humidity from wet and dry bulb thermometer, and index of refraction of fused quartz.

WHEN WORKING OUTSIDE AN ELEVATOR hatchway near door openings, do not lean ladders in such a manner that they might slip. *National Safety Council.*

# Market Reviews

## CRUDE RUBBER

### Commodity Exchange

TABULATED WEEK-END CLOSING PRICES

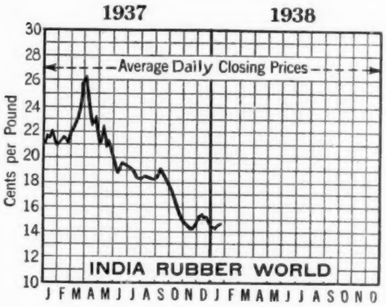
| Futures | Nov. 27 | Jan. 1 | Jan. 8 | Jan. 15 | Jan. 22 |
|---|---|---|---|---|---|
| Dec. | 14.57 | ..... | ..... | ..... | ..... |
| Jan. | 14.66 | 14.54 | 14.30 | 14.70 | 14.81 |
| Mar. | 14.76 | 14.68 | 14.53 | 14.90 | 14.98 |
| July | 15.02 | 14.85 | 14.76 | 15.12 | 15.27 |
| Sept. | 15.12 | 14.95 | 14.85 | 15.23 | 15.36 |
| Dec. | ..... | ..... | 15.00 | 15.38 | 15.51 |
| Volume per week (tons) | 11,060 | 13,710 | 14,570 | 10,950 | 8,580 |

### New York Quotations

*New York outside market rubber quotations in cents per pound*

| | Jan. 27, 1937 | Dec. 29, 1937 | Jan. 26, 1938 |
|---|---|---|---|
| **Plantations** | | | |
| Rubber latex...*gal.* | 77/78 | 56/57 | 56/57 |
| **Paras** | | | |
| Upriver fine | 22¾ | 14¾ | 13¼ |
| Upriver fine | *28½ | *20 | *19¼ |
| Upriver coarse | 15 | 9 | 9 |
| Upriver coarse | *21½ | *15 | *15 |
| Islands fine | 22½ | 14 | 13 |
| Islands fine | *28 | *19 | *18½ |
| Acre, Bolivian fine | 23¼ | 15 | 13½ |
| Acre, Bolivian fine | *28½ | *20½ | *19½ |
| Beni, Bolivian fine | 23½ | 15½ | 14½ |
| Madeira fine | 22¾ | 14¾ | 13½ |
| **Caucho** | | | |
| Upper ball | 15 | 9 | 9 |
| Upper ball | *21½ | *15 | *15 |
| Lower ball | 14 | 8½ | 8¾ |
| **Pontianak** | | | |
| Pressed block | 12/22 | 15/31 | 14/33 |
| **Guayule** | | | |
| Duro, washed and dried | 16 | 12½ | 12 |
| Ampar | 16½ | 13 | 12½ |
| **Africans** | | | |
| Rio Nuñez | 18 | 16 | 16 |
| Black Kassai | 18 | 15 | 16 |
| Prime Niger flake | 29 | 26 | 25 |
| **Gutta Percha** | | | |
| Gutta Siak | 10½ | 13 | 13½ |
| Gutta Soh | 14 | 18½ | 22 |
| Red Macassar | 1.00 | 1.20/1.35 | 1.25/1.35 |
| **Balata** | | | |
| Block, Ciudad Bolivar | 30 | .. | 33 |
| Manaos block | 26 | 27 | 27 |
| Surinam sheets Amber | 35 | 35 | 33 |
| Amber | 39 | 38 | 39 |

*Washed and dried crepe. Shipments from Brazil.




New York Outside Market—Spot Ribbed Smoked Sheets

THE Commodity Exchange table published here shows prices of representative future contracts on the New York market the past two months.

On December 31 the price for July futures was 14.85¢ per pound. After receding to 14.76¢ per pound on January 8, the market rallied as the belief gained ground that the International Rubber Regulation Committee may order a further cut in the export quota for the second quarter of 1938. July futures closed at 15.19¢ per pound on January 24. During the past four weeks the maximum variation in prices for delivery during the next year was 0.70¢ per pound. Trading during January was improved somewhat over December, with weekly volume ranging between 8,500 and 15,000 tons.

Crude rubber consumption in this country in December, amounting to only 29,160 tons, dropped below the 30,000-ton level for the first time since December, 1933.

The International Rubber Regulation Committee on January 25 reduced permissible rubber exports to 194,287 tons, or 60% of basic quotas for the second quarter of 1938, as compared with 226,669 tons, or 70% allowable for the first quarter. This action was taken presumably to raise the price structure to a higher level in keeping with the original purpose of the committee. Trading in crude rubber futures on the day of the announcement was active, and prices closed with net gains of 31 to 38 points.

On page 88 of this issue are reported United States statistics on imports, consumption, stocks, and crude rubber afloat during December.

### New York Outside Market

Factory buying and shipment business was at a virtual standstill during January with the exception of January 20, when the outside market was featured by the best shipment business in some time. This was due to a temporary speculative demand in anticipation of a further cut in the rubber export quota. After closing at 14 1/16¢ per pound on January 3, No. 1 ribbed smoked sheets moved upward during the month to close at 14 13/16¢ per pound on January 22. The price advanced ½¢ to 15⅜¢ per pound on January 25, the day exports were reduced by the IRRC.

The week-end closing prices on No. 1 ribbed smoked sheets follow: December 31, 14 9/16¢; January 8, 14⅜; January 15, 14¾; and January 22, 14 13/16¢.

### Rubber Trade Inquiries

*The inquiries that follow have already been answered; nevertheless they are of interest not only in showing the needs of the trade, but because of the possibility that additional information may be furnished by those who read them. The Editor is therefore glad to have those interested communicate with him.*

| No. | INQUIRY |
|---|---|
| 2423 | Manufacturer of small white extruded rubber tubing. |
| 2424 | Manufacturer of diathermy pads. |
| 2425 | Manufacturer of a cement with which to fasten rubber bands to the face of band saw wheels and withstand the action of dry ice during its cutting process. |
| 2426 | Manufacturer of rubber tire chains. |
| 2427 | Manufacturer of plastic rubber. |
| 2428 | Manufacturer of small rubber bags to be filled with water and used in the manufacture of truss pads. |
| 2429 | Manufacturer of Presstix. |

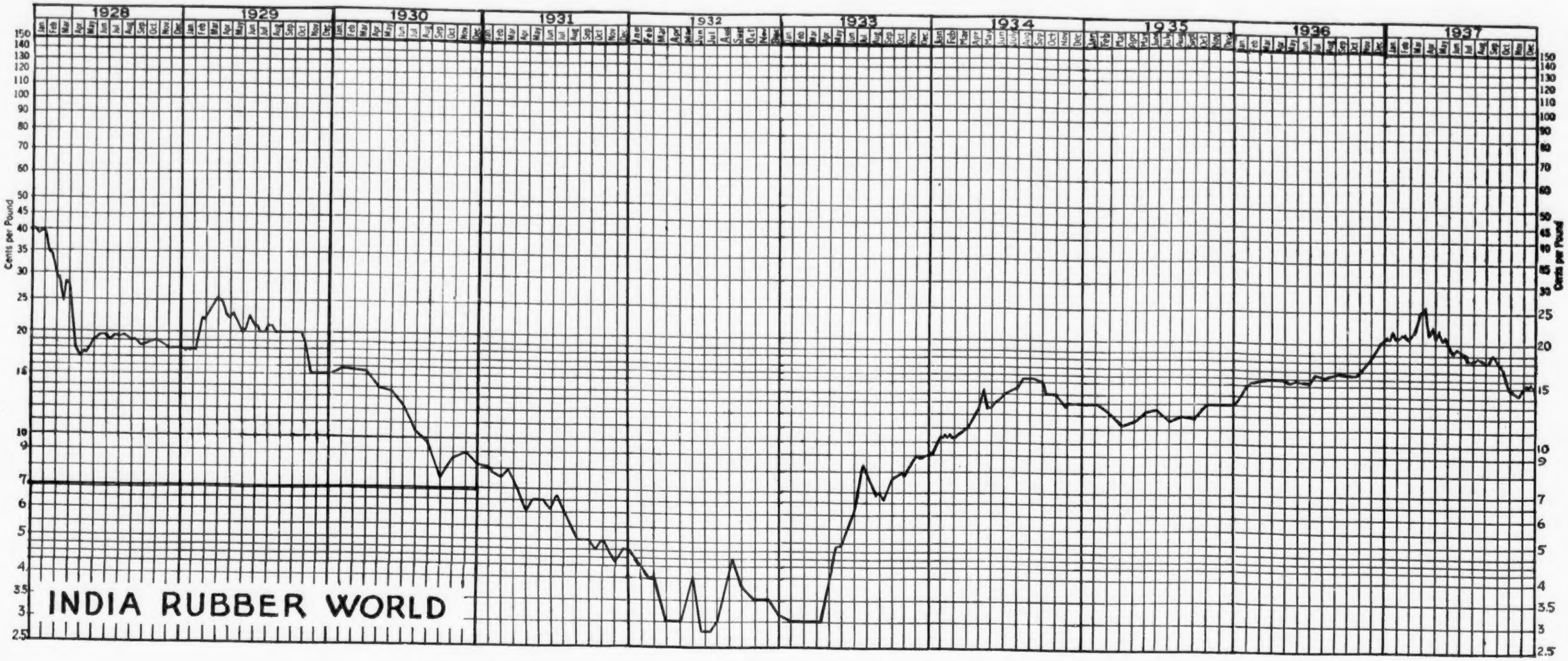
### New York Outside Market—Spot Closing Prices—Plantation Grades—Cents per Pound

| | December, 1937 | | | | | January, 1938 | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 27 | 28 | 29 | 30 | 31 | 1* | 3 | 4 | 5 | 6 | 7 | 8 | 10 | 11 | 12 | 13 | 14 | 15 | 17 | 18 | 19 | 20 | 21 | 22 |
| No. 1 Ribbed Smoked Sheet | 15 | 14 13/16 | 14½ | 14 9/16 | 14 9/16 | .. | 14 1/16 | 14 3/16 | 14¼ | 14⅜ | 14⅜ | 14⅜ | 14¾ | 14 11/16 | 14⅝ | 14⅝ | 14⅝ | 14¾ | 14 11/16 | 14 11/16 | 14 11/16 | 14⅞ | 14 13/16 | 14 13/16 |
| No. 2 Ribbed Smoked Sheet | 14 9/16 | 14⅜ | 14 1/16 | 14⅛ | 14 3/16 | .. | 13⅝ | 13¾ | 13 15/16 | 13 15/16 | 13 15/16 | 13 15/16 | 14¼ | 14⅛ | 14⅛ | 14⅛ | 14⅛ | 14¼ | 14 3/16 | 14 3/16 | 14 3/16 | 14⅜ | 14 7/16 | 14 7/16 |
| No. 3 Ribbed Smoked Sheet | 14⅛ | 14 | 13 11/16 | 13¾ | 13 13/16 | .. | 13¼ | 13⅜ | 13 7/16 | 13⅜ | 13⅜ | 13⅜ | 13⅝ | 13 9/16 | 13⅝ | 13⅝ | 13⅝ | 13¾ | 13 11/16 | 13 11/16 | 13 11/16 | 13 15/16 | 14 | 14 |
| No. 4 Ribbed Smoked Sheet | 13 15/16 | 13 13/16 | 13½ | 13 9/16 | 13⅝ | .. | 13 1/16 | 13 3/16 | 13¼ | 13 3/16 | 13 3/16 | 13 3/16 | 13 7/16 | 13⅜ | 13 7/16 | 13¾ | 13⅜ | 13½ | 13 7/16 | 13 7/16 | 13 7/16 | 13¾ | 13 13/16 | 13 13/16 |
| No. 1 Thin Latex Crepe | 15¼ | 15⅛ | 14 13/16 | 14⅞ | 14 15/16 | .. | 14 7/16 | 14 9/16 | 14⅝ | 14¾ | 14¾ | 14¾ | 15 3/16 | 15⅛ | 15⅛ | 15⅛ | 15⅛ | 15¼ | 15 3/16 | 15 3/16 | 15 3/16 | 15⅜ | 15 7/16 | 15 7/16 |
| No. 1 Thick Latex Crepe | 15¼ | 15⅛ | 14 13/16 | 14⅞ | 14 15/16 | .. | 14 7/16 | 14 9/16 | 14⅝ | 14¾ | 14¾ | 14¾ | 15 3/16 | 15⅛ | 15⅛ | 15⅛ | 15⅛ | 15¼ | 15 3/16 | 15 3/16 | 15 3/16 | 15⅜ | 15 7/16 | 15 7/16 |
| No. 1 Brown Crepe | 14⅛ | 14 | 13 11/16 | 13¾ | 13 11/16 | .. | 13 3/16 | 13 5/16 | 13⅜ | 13½ | 13½ | 13½ | 13⅞ | 13¾ | 13¾ | 13¾ | 13¾ | 13⅞ | 13 13/16 | 13 13/16 | 13 13/16 | 14 | 14⅛ | 14⅛ |
| No. 2 Brown Crepe | 13 15/16 | 13⅞ | 13 9/16 | 13⅝ | 13 9/16 | .. | 13 1/16 | 13 3/16 | 13¼ | 13⅜ | 13⅜ | 13⅜ | 13¾ | 13⅝ | 13⅝ | 13⅝ | 13⅝ | 13¾ | 13 11/16 | 13 11/16 | 13 11/16 | 13⅞ | 13 15/16 | 13 15/16 |
| No. 2 Amber | 14⅛ | 14 | 13 11/16 | 13¾ | 13 11/16 | .. | 13 3/16 | 13 5/16 | 13⅜ | 13½ | 13½ | 13½ | 13⅞ | 13¾ | 13¾ | 13¾ | 13¾ | 13⅞ | 13 13/16 | 13 13/16 | 13 13/16 | 14 | 14⅛ | 14⅛ |
| No. 3 Amber | 13 15/16 | 13⅞ | 13 9/16 | 13⅝ | 13 9/16 | .. | 13 1/16 | 13 3/16 | 13¼ | 13⅜ | 13⅜ | 13⅜ | 13¾ | 13⅝ | 13⅝ | 13⅝ | 13⅝ | 13¾ | 13 11/16 | 13 11/16 | 13 11/16 | 13⅞ | 13 15/16 | 13 15/16 |
| No. 4 Amber | 13⅜ | 13¼ | 12 13/16 | 13 | 13 1/16 | .. | 12 9/16 | 12 11/16 | 12¾ | 12⅞ | 12⅞ | 12⅞ | 13⅛ | 13 | 13 | 13 | 13 | 13⅛ | 13 1/16 | 13 1/16 | 13 1/16 | 13⅜ | 13 7/16 | 13 7/16 |
| Rolled Brown | 11 7/16 | 11 5/16 | 11 | 11 1/16 | 11 5/16 | .. | 10 13/16 | 10 15/16 | 11 | 11 | 11 | 11 | 11¼ | 11⅛ | 11⅛ | 11⅛ | 11⅛ | 11¼ | 11 3/16 | 11 3/16 | 11 3/16 | 11⅜ | 11½ | 11½ |

*Holiday.

## New York Outside Market—Low and High Spot Rubber Prices in Cents per Pound—1931-1937

| | January | February | March | April | May | June | July | August | September | October | November | December |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1931, No. 1 thin latex crepe | 8⅛/ 8⅞ | 7½/ 8¼ | 7⅛/ 8⅝ | 6 / 7⅛ | 6¼/ 7⅛ | 6⅜/ 7½ | 6⅛/ 7⅛ | 5½/ 6⅛ | 4⅞/ 5⅜ | 4⅞/ 5 9⁄16 | 4⅝/ 5⅜ | 4⅝/ 5 9⁄16 |
| Ribbed smoked sheet | 7⅞/ 8½ | 7¼/ 8 | 6⅞/ 8⅜ | 5⅞/ 6⅞ | 6 / 6⅞ | 6⅛/ 7 | 5¾/ 6¾ | 5 1⁄16/ 5¾ | 4 9⁄16/ 5⅜ | 4½/ 5 9⁄16 | 4⅜/ 5 | 4 9⁄16/ 5 9⁄16 |
| Upriver fine | ........ | 9¼/.... | 9 / 9⅜ | 8¼/ 9 | 8¼/ 8⅝ | 8⅛/ 8¼ | 8¼/ 8¾ | 7⅛/ 8⅝ | 6 / 7¼ | 6 /.... | 5¾/ 6¼ | 5½/ 5¾ |
| 1932, No. 1 thin latex crepe | 4¾/ 5⅛ | 4 9⁄16/ 4⅞ | 4 9⁄16/ 4⅝ | 3 15⁄16/ 4¼ | 3 15⁄16/ 5 | 3 9⁄16/ 3 15⁄16 | 3 9⁄16/ 4 | 4 / 5 1⁄16 | 4 / 5⅛ | 3⅞/ 4¼ | 3⅞/ 4⅛ | 3 15⁄16/ 3 15⁄16 |
| Ribbed smoked sheet | 4¼/ 4¾ | 3 11⁄16/ 4¼ | 3 / 3⅝ | 2 15⁄16/ 3⅛ | 2¾/ 4 9⁄16 | 2⅝/ 2¾ | 2⅝/ 3 9⁄16 | 3 9⁄16/ 4½ | 3 7⁄16/ 4 9⁄16 | 3 9⁄16/ 3 15⁄16 | 3 9⁄16/ 3 9⁄16 | 3 9⁄16/ 3⅜ |
| Upriver fine | 5½/ 5¾ | 5¼/ 5½ | 5 / 5¼ | 5 / 5¼ | 5½/ 5¾ | 5½/.... | 5½/ 5¾ | 5¾/ 7½ | 6½/ 7¾ | 7¼/ 7¾ | 7¼/ 7½ | 6½/ 7½ |
| 1933, No. 1 thin latex crepe | 3⅝/ 3⅞ | 3⅝/ 3 11⁄16 | 3⅝/ 3⅞ | 3¾/ 5 | 5 9⁄16/ 6⅞ | 5⅞/ 7 9⁄16 | 7⅜/10½ | 7½/ 8¼ | 7½/ 9⅛ | 7¾/ 8⅞ | 8½/10⅛ | 9⅞/10½ |
| Ribbed smoked sheet | 2 15⁄16/ 3¼ | 2⅞/ 3 | 2 15⁄16/ 3 1⁄16 | 2 15⁄16/ 4¼ | 4 9⁄16/ 6⅛ | 5¼/ 6 7⁄16 | 6½/ 9⅜ | 6⅝/ 7⅞ | 6⅝/ 8¼ | 6⅞/ 8 | 7¾/ 9⅛ | 8½/ 9 9⁄16 |
| Upriver fine | 6 / 6¼ | 6 /.... | 6 /.... | 6 / 6½ | 6¼/ 8¼ | 7½/ 8½ | 8¼/11 | 9¾/11 | 8¾/ 9¾ | 8 / 9¼ | 8 / 9 | 9 /.... |
| 1934, No. 1 thin latex crepe | 10¼/11¾ | 11¼/12⅛ | 11⅞/13¼ | 13⅛/15¾ | 14 /17⅛ | 14¾/16 | 15⅞/16⅝ | 16¼/17⅛ | 15¾/16¾ | 13¾/15½ | 13⅜/14¼ | 13¼/13⅞ |
| No. 1 ribbed smoked sheet | 8¾/10⅜ | 9 13⁄16/10¾ | 10 9⁄16/11⅝ | 11¼/13⅝ | 12 /15¼ | 12¾/14⅛ | 13 15⁄16/14⅞ | 14 15⁄16/15¼ | 14¾/15⅞ | 13 /14½ | 12 9⁄16/13⅜ | 12¾/13⅛ |
| Upriver fine | 8¾/ 9 | 9 / 9¾ | 9¾/10¼ | 10¼/11 | 11 /13¼ | 11 /12 | 11¼/12 | 11½/11¾ | 10¾/11¾ | 10 /10¾ | 9¾/10 | 9½/ 9¾ |
| 1935, No. 1 thin latex crepe | 12¾/14⅛ | 13 /13¾ | 10⅝/12⅞ | 10⅞/12¼ | 11⅝/13 | 12⅝/13 1⁄16 | 11 15⁄16/12¾ | 11 15⁄16/12⅜ | 11½/12¼ | 12 /13¾ | 13 9⁄16/13 11⁄16 | 13⅛/13 15⁄16 |
| No. 1 ribbed smoked sheet | 12⅜/13 11⁄16 | 12 9⁄16/13⅜ | 10⅜/12 9⁄16 | 10 13⁄16/12 | 11⅜/12¾ | 12 3⁄16/12 13⁄16 | 11¾/12 7⁄16 | 11 15⁄16/12¼ | 11⅛/12 | 11¾/13½ | 12 15⁄16/13⅜ | 12¾/13 9⁄16 |
| Upriver fine | 9¼/ 9¾ | 9½/ 9¾ | 9 / 9½ | 8¾/ 9½ | 9¼/ 9½ | 9⅝/10½ | 9¼/10 | 9¾/10⅛ | 9⅞/10½ | 10½/12¼ | 12 /13½ | 12 /13⅝ |
| 1936, No. 1 thin latex crepe | 13⅞/15 7⁄16 | 15 7⁄16/16 3⁄16 | 16 1⁄16/16 7⁄16 | 16 1⁄16/16 7⁄16 | 15⅝/16 3⁄16 | 15 13⁄16/16½ | 16½/17 1⁄16 | 16 11⁄16/16 13⁄16 | 16⅞/17¼ | 16 13⁄16/17 11⁄16 | 17¾/19 9⁄16 | 19¼/24⅛ |
| No. 1 ribbed smoked sheet | 13½/15 1⁄16 | 15 1⁄16/15¾ | 15⅝/16 1⁄16 | 15 13⁄16/16⅛ | 15 9⁄16/15 15⁄16 | 15⅝/16 3⁄16 | 16 3⁄16/16 11⁄16 | 16⅛/16 7⁄16 | 16¼/16⅝ | 16 9⁄16/17 1⁄16 | 17⅛/18 9⁄16 | 18½/23 |
| Upriver fine | 12 /13 | 13 /16½ | 15¾/16¾ | 16¾/18¾ | 17½/18½ | 17¼/17½ | 17½/17⅞ | 17⅞/20½ | 20½/21 | 20½/21½ | 21½/23¾ | 23½/25⅛ |
| 1937, No. 1 thin latex crepe | 21 11⁄16/23½ | 22⅛/24½ | 24 7⁄16/31 | 24⅞/31½ | 25 /26½ | 22¼/25⅝ | 20 /22⅝ | 19¼/20 | 18½/20 9⁄16 | 15½/18¾ | 14½/16 | 14 15⁄16/15 15⁄16 |
| No. 1 ribbed smoked sheet | 20 11⁄16/22⅜ | 20 13⁄16/21⅞ | 21 13⁄16/26⅞ | 20⅞/26⅞ | 20⅜/22½ | 18½/20 9⁄16 | 18 9⁄16/19⅝ | 18 9⁄16/18 11⁄16 | 17½/19 9⁄16 | 14¾/17¾ | 14 /15 9⁄16 | 14½/15 9⁄16 |
| Upriver fine | 24 /25 | 25 /.... | 22 /25 | 22 /22¾ | 22 /22¾ | 20 /22 | 20 /20¼ | 19½/20¼ | 19½/19¾ | 16½/19¾ | 14½/16½ | 15 /15¼ |




New York Outside Market—Closing Prices Ribbed Smoked Sheets—1928 - 1937

## COMPOUNDING INGREDIENTS

BUSINESS in general continued inactive through January. The expected improvement in consumer interest is not evident as yet, and buyers have not been inclined to purchase in advance of immediate requirements. The market has been generally steady with few price changes taking place.

CARBON BLACK. The price situation has continued weak and unsettled, and prices declined further in January. The base price at Texas is now 2¼¢ per pound for either tank car or carload lots in bags, which results in a price of 3.3¢ delivered Akron, O. With consumption at a low level, demand has continued slow.

FACTICE OR RUBBER SUBSTITUTE. The demand for rubber substitute has been light, and prices of some grades are lower. Prices of substitutes made from rapeseed oil remain firm.

LITHARGE. The car-lot price took its first upward turn since last August and increased 0.15¢ to a range of 6.4 to 6.65¢ per pound. This boost was not sufficient, however, to alter the l.c.l. prices.

LITHOPONE. Although buyers have been indisposed to buy for inventory, there has been a more rapid withdrawal since the beginning of the year. The price continues steady and unchanged.

RUBBER CHEMICALS. January business showed some improvement over December. No appreciable price changes have been made on rubber chemicals.

RUBBER SOLVENTS. Deliveries into the Akron tire district were light last month. The mid-continent market position was unchanged.

STEARIC ACID. The market occupied a firm position as a result of an advance in tallow, but previous selling schedules have been adhered to by acid producers. Business activity continues at a slow rate.

TITANIUM PIGMENTS. Activity at the start of the January period was slow, but ordering increased to a fair amount as the month progressed.

ZINC OXIDE. Leaded zinc oxides underwent statistical improvement with the upturn in metallic lead. However there has been no change in the oxide price structure. Demand from rubber goods manufacturers has been slow, but slightly improved over December. Bids were opened by the Navy Department on January 18 for 1,000,000 pounds of zinc oxide for the Norfolk yard and 700,000 pounds for Mare Island.

### New York Quotations

January 24, 1938

Prices Not Reported Will Be Supplied on Application

| | | |
|---|---|---|
| **Abrasives** | | |
| Pumicestone, powdered | lb. | $0.03 / $0.035 |
| Rottenstone, domestic | lb. | .03 / .035 |
| Silica, 15 | ton | 38.00 |
| **Accelerators, Inorganic** | | |
| Lime, hydrated, l.c.l., New York | ton | 20.00 |
| Litharge (commercial) | lb. | .0675 / .0725 |
| **Accelerators, Organic** | | |
| A-1 | lb. | .26 |
| A-5-10 | lb. | .35 / .40 |
| A-10 | lb. | .35 / .40 |
| A-11 | lb. | .52 / .65 |
| A-19 | lb. | .52 / .65 |
| A-32 | lb | .70 / .80 |
| A-77 | lb. | .42 / .55 |
| A-100 | lb. | .42 / .55 |
| A-433 | lb. | .45 / .55 |
| Accelerator 49 | lb. | .42 |
| 808 | lb. | |
| 833 | lb. | |
| Acrin | lb. | |
| Aldehyde ammonia | lb. | |
| Altax | lb. | |
| B-J-F | lb. | |
| Beutene | lb. | |
| Butyl Zimate | lb. | |
| C-P-B | lb. | |
| Captax | lb. | |
| Crylene | lb. | |
| Paste | lb. | |
| D-B-A | lb. | |
| Di-Esterex | lb. | |
| Di-Esterex-N | lb. | |
| DOTG | lb. | .47 |
| D.O.T.T.U. | lb. | |
| DPG | lb. | .35 / .45 |
| El-Sixty | lb. | .50 / .65 |
| Ethylideneaniline | lb. | |
| Formaldehyde P.A.C. | lb. | |
| Formaldehydeaniline | lb. | |
| Formaldehyde-para-toluidine | lb. | |
| Guantal | lb. | .40 / .50 |
| Hepteen | lb. | |
| Base | lb. | |
| Hexamethylenetetramine | lb. | |
| Lead oleate, No. 999 | lb. | .13 |
| Witco | lb. | .15 |
| Methylenedianilide | lb. | |
| Monex | lb. | |
| Novex | lb. | |
| O. N. V. | lb | .50 / .55 |
| O-X-A-F | lb. | .50 / .55 |
| Ovac | lb. | |
| Pip-Pip | lb. | 2.50 |
| Pipsolene | lb. | 1.55 / 1.85 |
| R-2 | lb. | 1.40 / 1.80 |
| Base | lb. | 3.65 |
| R-23 | lb. | .40 |
| R & H 50-D | lb. | |
| Safex | lb. | |
| Super-sulphur No. 1 | lb. | |
| No. 2 | lb. | |
| Tetrone A | lb. | |
| Thiocarbanilide | lb. | $0.24 / $0.30 |
| Thionex | lb. | |
| Trimene | lb. | |
| Base | lb. | |
| Triphenyl guanidine (TPG) | lb. | |
| Tuads | lb. | |
| Ureka | lb. | .60 / .75 |
| Blend B | lb. | .60 / .75 |
| C | lb. | .56 / .65 |
| Vulcanex | lb. | |
| Vulcanol | lb. | |
| Vulcone | lb. | |
| Z-B-X | lb. | |
| Z-88-P | lb. | .51 |
| Zenite | lb. | |
| A | lb. | |
| B | lb. | |
| Zimate | lb. | |
| ZML | lb. | |
| **Activator** | | |
| Barak | lb. | |
| **Age Resisters** | | |
| AgeRite Alba | lb. | |
| Exel | lb. | |
| Gel | lb. | |
| Hipar | lb. | |
| HP | lb. | |
| Powder | lb. | |
| Resin | lb. | |
| D | lb. | |
| Syrup | lb. | |
| White | lb. | |
| Akroflex C | lb. | |
| Albasan | lb. | |
| Antox | lb. | |
| B-L-E | lb. | |
| B-X-A | lb. | |
| Copper Inhibitor X-872 | lb. | |
| Flectol B | lb. | .52 / .65 |
| H | lb. | .52 / .65 |
| White | lb. | .90 / 1.15 |
| M-U-F | lb. | |
| Neozone (standard) | lb. | |
| A | lb. | |
| C | lb. | |
| D | lb. | |
| E | lb. | |
| Oxynone | lb. | .64 / .80 |
| Parazone | lb. | |
| Perflectol | lb. | .65 / .75 |
| Permalux | lb. | |
| Santoflex A | lb. | .65 / .75 |
| B | lb. | .52 / .65 |
| Solux | lb. | |
| Thermoflex | lb. | |
| A | lb. | |
| V-G-B | lb. | |
| **Alkalies** | | |
| Caustic soda, flake, Columbia (400 lb. drums) | 100 lbs. | 2.70 / 3.55 |
| liquid, 50% | 100 lbs. | 1.95 |
| solid (700 lb. drums) | 100 lbs. | 2.30 / 3.15 |
| **Antiscorch Materials** | | |
| A-F-B | lb. | |
| Antiscorch T | lb. | |
| Cumar RH | lb. | $0.09 |
| R-17 Resin (drums) | lb. | .10 |
| Retarder B | lb. | |
| W | lb. | |
| T-J-B | lb. | |
| U.T.B. | lb. | |
| **Antisun Materials** | | |
| Heliozone | lb. | |
| Sunproof | lb. | |
| **Brake Lining Saturant** | | |
| B. R. T. No. 3 | lb. | .0165 / $0.0175 |
| **Colors** | | |
| BLACK | | |
| Lampblack (commercial) | lb. | .15 |
| BLUE | | |
| Brilliant | lb. | |
| Prussian | lb. | .0375 |
| Toners | lb. | .08 / 3.85 |
| BROWN | | |
| Mapico | lb. | .13 |
| GREEN | | |
| Brilliant | lb. | |
| Chrome, light | lb. | |
| medium | lb. | |
| oxide (freight allowed) | lb. | .22 |
| Dark | lb. | |
| Guignet's, Easton, Pa., bbls. | lb. | .70 |
| Light | lb. | |
| Toners | lb. | .85 / 3.75 |
| ORANGE | | |
| Lake | lb. | |
| Toners | lb. | .40 / 1.60 |
| ORCHID | | |
| Toners | lb. | 1.50 / 2.00 |
| PINK | | |
| Toners | lb. | 1.50 / 4.15 |
| PURPLE | | |
| Permanent | lb. | |
| Toners | lb. | .60 / 2.10 |
| RED | | |
| Antimony | | |
| Crimson, 15/17% | lb. | .45 |
| R. M. P. No. 3 | lb. | .48 |
| Sulphur free | lb. | .50 |
| R.M.P. | lb. | .52 |
| Golden 15/17% | lb. | .28 |
| 7-A | lb. | .37 |
| Z-2 | lb. | .23 |
| Aristi | lb. | 1.75 |
| Cadmium, light (400 lb. bbls.) | lb. | .76 / .81 |
| Chinese | lb. | |
| Crimson | lb. | |
| Mapico | lb. | .0925 |
| Medium | lb. | |

| | | |
|---|---|---|
| Rub-Er-Red, Easton, Pa., bbls. | lb. | $0.0925 |
| Scarlet | lb. | |
| Toners | lb. | .08 /$2.00 |

**WHITE**

| | | |
|---|---|---|
| Lithopone (bags) | lb. | .04⅜/ .04⅝ |
| Albalith Black Label-11 | lb. | .04⅜/ .04⅝ |
| Astrolith | lb. | .04⅜/ .04⅝ |
| Azolith | lb. | .04⅜/ .04⅝ |
| Cryptone-19 | lb. | .05⅞/ .06⅛ |
| CB-21 | lb. | .05⅞/ .06⅛ |
| ZS No. 20 | lb. | .09 / .0925 |
| No. 86 | lb. | .09 / .0925 |
| Sunolith | lb. | .04⅜/ .04⅝ |
| Ray-Bar | lb. | |
| Ray-Cal | lb. | |
| Rayox | lb. | |
| Titanolith (5-ton lots) | lb. | .05⅞/ .06⅛ |
| Titanox-A (50-lb. bags) | lb. | .16 / .1675 |
| B (50-lb. bags) | lb. | .05⅞/ .06⅛ |
| B-30 (50-lb. bags) | lb. | .05⅞/ .06⅛ |
| C (50-lb. bags) | lb. | .05⅞/ .06⅛ |
| Ti-Tone | lb. | |
| Zinc Oxide | | |
| Anaconda, Green Seal No. 333 | lb. | .08 / .085 |
| Lead Free No. 352 | lb. | .075 / .08 |
| No. 570 | lb. | .075 / .08 |
| No. 577 | lb. | .075 / .08 |
| Red Seal No. 222 | lb. | .075 / .08 |
| U.S.P. No. 777 (bbls.) | lb. | .095 / .0975 |
| White Seal No. 555 | lb. | .085 / .09 |
| Azo ZZZ-11 | lb. | .0625/ .065 |
| 44 | lb. | .0625/ .065 |
| 55 | lb. | .0625/ .065 |
| 66 | lb. | .0625/ .065 |
| French Process, Florence | | |
| White Seal-7 (bbls.) | lb. | .085 / .0875 |
| Green Seal-8 | lb. | .08 / .0825 |
| Red Seal-9 | lb. | .075 / .0775 |
| Kadox, Black Label-15 | lb. | .065 / .0675 |
| Red Label-17 | lb. | .065 / .0675 |
| No. 25 | lb. | .075 / .0775 |
| Horse Head Special 3 | lb. | .0625/ .065 |
| XX Red-4 | lb. | .0625/ .065 |
| 23 | lb. | .0625/ .065 |
| 72 | lb. | .0625/ .065 |
| 78 | lb. | .0625/ .065 |
| 80 | lb. | .0625/ .065 |
| 103 | lb. | .0625/ .065 |
| 110 | lb. | .0625/ .065 |
| St. Joe (lead free) | | |
| Black Label | lb. | .0625/ .065 |
| Green Label | lb. | .0625/ .065 |
| Red Label | lb. | .0625/ .065 |
| U.S.P. | lb. | .095 / .0975 |
| White Jack | lb. | .05⅞/ .06⅛ |
| Zopaque (bags) | lb. | .16 / .1675 |

**YELLOW**

| | | |
|---|---|---|
| Cadmolith (cadmium yellow), 400 lb. bbls. | lb. | .51 / .56 |
| Lemon | lb. | |
| Mapico | lb. | .0925 |
| Toners | lb. | 2.50 |

## Dispersing Agents

| | | |
|---|---|---|
| Bardol | lb. | .0215/ .024 |
| Darvan | lb. | |
| Nevoll (drums) | lb. | .0215 |
| Santomerse | lb. | .11 / .25 |

## Fillers, Inert

| | | |
|---|---|---|
| Asbestine, c.l., f.o.b. mills | ton | 15.00 |
| Barytes | ton | 20.00 /36.00 |
| f.o.b. St. Louis (50 lb. paper bags) | ton | 22.85 |
| Barytes, off color, domestic | ton | 20.00 /25.00 |
| white, imported | ton | 29.00 /32.00 |
| Blanc fixe, dry, precip. | lb. | .035 / .05 |
| Calcene | ton | 37.50 /45.00 |
| Infusorial earth | lb. | .02 / .03 |
| Kalite No. 1 | ton | |
| No. 3 | ton | |
| Magnesia, calcined, heavy | lb. | .04 |
| Carbonate, l.c.l. | lb. | .065 / .09 |
| Pyrax | ton | |
| Whiting | | |
| Columbia Filler | ton | 9.00 /14.00 |
| Domestic | 100 lbs. | |
| Guilders | 100 lbs. | |
| Hakuenka | lb. | |
| Paris white, English cliffstone | 100 lbs. | |
| Southwark Brand, Commercial | 100 lbs. | |
| All other grades | 100 lbs. | |
| Suprex, white extra light | ton | 45.00 /60.00 |
| heavy | ton | 45.40 /60.00 |
| Witco, c.l. | ton | 7.00 |

## Fillers for Pliability

| | | |
|---|---|---|
| P-33 | lb. | |
| Thermax | lb. | |
| Velvetex | lb. | .03 / .045 |

## Finishes

| | | |
|---|---|---|
| IVCO lacquer, clear | gal. | 1.55 / 2.55 |
| colors | gal. | 2.60 / 3.25 |
| Rubber lacquer, clear | gal. | |
| colored | gal. | |
| Starch, corn, pwd. | 100 lbs. | |
| potato | lb. | |
| Talc | ton | 25.00 /45.00 |

## Flock

| | | |
|---|---|---|
| Cotton flock, dark | lb. | $0.12 /$0.13 |
| dyed | lb. | .50 / .85 |
| white | lb. | .145 / .20 |
| Rayon flock, colored | lb. | 1.25 / 2.00 |
| white | lb. | 1.00 / 1.25 |

## Latex Compounding Ingredients

| | | |
|---|---|---|
| Accelerator 85 | lb. | |
| 89 | lb. | |
| 122 | lb. | |
| 552 | lb. | |
| Aerosol | lb. | .45 |
| Antox, Dispersed | lb. | |
| Aquarex A | lb. | |
| D | lb. | |
| F | lb. | |
| Areskap No. 50 | lb. | .18 / .24 |
| No. 100, dry | lb. | .39 / .51 |
| Aresket No. 240 | lb. | .16 / .22 |
| No. 250, alcoholic | lb. | .22 |
| No. 300, dry | lb. | .42 / .50 |
| Aresklene No. 375 | lb. | .35 / .50 |
| No. 400, dry | lb. | .51 / .65 |
| Black No. 25, Dispersed | lb. | .22 / .40 |
| Catalpo | ton | |
| Color Pastes, Dispersed | lb. | |
| Dispersex No. 15 | lb. | .11 / .12 |
| No. 20 | lb. | .08 / .10 |
| Emo, brown | lb. | .15 |
| white | lb. | .15 |
| Factice Compound, Dispersed | lb. | .35 |
| Heliozone, Dispersed | lb. | |
| Igepon A | lb. | |
| MICRONEX, Colloidal | lb. | .055 / .07 |
| Nekal BX (dry) | lb. | |
| Palmol | lb. | .10 |
| Paradors | lb. | |
| R-23 | lb. | .57 |
| S.1 (400 lb. drums) | lb. | .65 |
| Santomerse | lb. | .13 |
| Stablex A | lb. | .90 / 1.10 |
| B | lb. | .65 / .90 |
| C | lb. | .40 / .50 |
| Sulphur, Dispersed | lb. | .10 / .15 |
| No. 2 | lb. | |
| T.1. (400 lb. drums) | lb. | .40 |
| Tepidone | lb. | |
| Vulcan Colors | lb. | |
| Zinc oxide, Colloidal | lb. | |
| Dispersed | lb. | .12 / .15 |

## Mineral Rubber

| | | |
|---|---|---|
| B. R. C. No. 20 | lb. | .009 / .01 |
| Black Diamond | ton | 25.00 |
| Genasco Hydrocarbon, granulated, (fact'y) | ton | |
| solid | ton | |
| Gilsonite Hydrocarbon (factory) | ton | |
| Hydrocarbon, hard | ton | |
| soft | ton | |
| Parmr Grade 1 | ton | 25.00 /27.00 |
| Grade 2 | ton | 25.00 /27.00 |
| Pioneer | ton | |
| 265° | ton | |

## Mold Lubricants

| | | |
|---|---|---|
| Lubrex | lb. | .25 / .30 |
| Mold Paste | lb. | .12 / .18 |
| Sericite | ton | 65.00 /75.00 |
| Soapbark | lb. | |
| Soapstone | ton | 25.00 /35.00 |

## Oil Resistant

| | | |
|---|---|---|
| AXF | lb. | |

## Reclaiming Oils

| | | |
|---|---|---|
| B. R. V. | lb. | .03 / .0325 |
| S. R. O. | lb. | .0175/ .0185 |

## Reenforcers

| | | |
|---|---|---|
| Carbon Black | | |
| Aerfloted Arrow Specification Black | lb. | |
| Arrow Compact Granulized Carbon Black | lb. | |
| "Certified" Heavy Compressed, Cabot | lb. | |
| Spheron | lb. | |
| Continental Dustless | lb. | .0270/ .0360 |
| Compressed c.l. | lb. | .0270/ .0360 |
| Uncompressed, c.l. | lb. | .0270/ .0360 |
| Disperso, c.l. | lb. | .0270/ .0360 |
| Dixie, c.l., f.o.b. New Orleans, La., Galveston or Houston, Tex. | lb. | .027 |
| c.l., delivered New York | lb. | .036 |
| local stock, bags, delivered | lb. | .0625 |
| Dixiedensed, c.l., f.o.b. New Orleans, La., Galveston or Houston, Tex. | lb. | .027 |
| c.l., delivered New York | lb. | .036 |
| local stock, bags, delivered | lb. | .0625 |
| Dixiedensed 66, c.l., f.o.b. New Orleans, La., Galveston or Houston, Tex. | lb. | .027 |
| c.l., delivered New York | lb. | .036 |
| local stock, bags, delivered | lb. | .0625 |
| Excello, c.l., f.o.b. Gulf ports | lb. | $0.0445/$0.0645 |
| delivered New York | lb. | .0505/ .0705 |
| l.c.l., delivered New York | lb. | .07 / .09 |
| Fumonex, c.l., f.o.b. works | lb. | .03 |
| ex-warehouse | lb. | .045 |
| Gastex | lb. | .03 / .07 |
| Kosmobile, c.l., f.o.b. New Orleans, La., Galveston or Houston, Tex. | lb. | .027 |
| c.l., delivered New York | lb. | .036 |
| local stock, bags, delivered | lb. | .0625 |
| Kosmobile 66, c.l., f.o.b New Orleans, La., Galveston or Houston, Tex. | lb. | .027 |
| c.l., delivered New York | lb. | .036 |
| local stock, bags, delivered | lb. | .0625 |
| Kosmos, c.l., f.o.b. New Orleans, La., Galveston or Houston, Tex. | lb. | .027 |
| c.l., delivered New York | lb. | .036 |
| local stock, bags, delivered | lb. | .0625 |
| MICRONEX Beads, c.l., f.o.b. Gulf ports | lb. | .027 |
| c.l., delivered New York | lb. | .036 |
| local, stock, bags, delivered | lb. | .0625 |
| Mark II, c.l., f.o.b. Gulf ports | lb. | .027 |
| c.l., delivered New York | lb. | .036 |
| local, stock, bags, delivered | lb. | .0625 |
| Standard, c.l., f.o.b. Gulf ports | lb. | .027 |
| c.l., delivered New York | lb. | .036 |
| local, stock, bags, delivered | lb. | .0625 |
| W-5, c.l., f.o.b., Gulf ports | lb. | .027 |
| c.l., delivered New York | lb. | .036 |
| local, stock, bags, delivered | lb. | .0625 |
| W-6, c.l., f.o.b., Gulf ports | lb. | .027 |
| c.l., delivered New York | lb. | .036 |
| local, stock, bags, delivered | lb. | .0625 |
| Paradene No. 2 (drums) | lb. | .04 |
| Pelletex | lb. | .03 / .07 |
| Supreme, c.l., f.o.b. Gulf ports | lb. | .0445/ .0645 |
| delivered New York | lb. | .0505/ .0705 |
| l.c.l. delivered New York | lb. | .07 / .09 |
| "WYEX BLACK" | lb. | |
| Carbonex (bags) | lb. | .029 / .0315 |
| "S" (bags) | lb. | .0315/ .034 |
| Clays | | |
| Aerfloted Paragon (50 lb. bags) | ton | 9.50 |
| Suprex (50 lb. bags) | ton | 9.50 |
| China | ton | 17.50 /20.00 |
| Dixie | ton | |
| Junior | ton | |
| McNamee | ton | |
| Par | ton | |
| Witco, f.o.b. Works | ton | 9.50 |
| Cumar EX | lb. | .035 |

## Reodorants

| | | |
|---|---|---|
| Amora A | lb. | |
| B | lb. | |
| C | lb. | |
| D | lb. | |
| Curodex 19 | lb. | 2.75 |
| 188 | lb. | 3.50 |
| 198 | lb. | 4.50 |
| Paradors | lb. | |
| Rodo No. 0 | lb. | |
| No. 10 | lb. | |

## Rubber Substitutes

| | | |
|---|---|---|
| Black | lb. | .07 / .135 |
| Brown | lb. | .085 / .14 |
| White | lb. | .085 / .1525 |
| Factice | | |
| Amberex | lb. | .19 |
| Brown | lb. | .085 / .14 |
| Neophax A | lb. | .11 |
| B | lb. | .11 |
| Fac-Cel B | lb. | .1625 |
| C | lb. | .1625 |
| White | lb. | .095 / .155 |

## Softeners

| | | |
|---|---|---|
| Burgundy pitch | lb. | .06 |
| Cycline oil | gal. | .14 / .20 |
| Nuba resinous pitch (drums) | | |
| Grades No. 1 and No. 2 | lb. | .03 |
| Grade No. 3 | lb. | .04 |
| Palm oil (Witco), c.l. | lb. | .0575 |
| Pine tar | gal. | |

(*Continued on page 86*)

## COTTON AND FABRICS

New York Cotton Exchange Week-End Closing Prices

| Futures | Nov. 27 | Jan. 1 | Jan. 8 | Jan. 15 | Jan. 22 |
|---|---|---|---|---|---|
| Dec. | 8.07 | .... | .... | .... | .... |
| Jan. | 8.10 | 8.19 | 8.44 | .... | .... |
| Mar. | 8.17 | 8.28 | 8.49 | 8.53 | 8.43 |
| July | 8.22 | 8.42 | 8.63 | 8.65 | 8.56 |
| Sept. | 8.24 | 8.46 | 8.67 | 8.71 | 8.62 |
| Dec. | .... | 8.51 | 8.72 | 8.77 | 8.69 |

### New York Quotations

January 21, 1938

**Drills**

| | | |
|---|---|---|
| 38-inch 2.00-yard | yd. | $0.11 |
| 40-inch 3.47-yard | | .06⅞ |
| 50-inch 1.52-yard | | .15 |
| 52-inch 1.85-yard | | .12½ |
| 52-inch 1.90-yard | | .12⅜ |
| 52-inch 2.20-yard | | .11¼ |
| 52-inch 2.50-yard | | .10½ |
| 59-inch 1.85-yard | | .13 |

**Ducks**

| | | |
|---|---|---|
| 38-inch 2.00-yard D. F. | yd. | .11 |
| 40-inch 1.45-yard S. F. | | .16¼ |
| 51½-inch 1.35-yard D. F. | | .16¼ |
| 72-inch 1.05-yard D. F. | | .22 /.23 |
| 72-inch 17.21-ounce | | .25¼ |
| **Mechanicals** | | |
| Hose and belting | lb. | .24 |
| **Tennis** | | |
| 52-inch 1.35-yard | yd. | .17 |

**Hollands**

| | | |
|---|---|---|
| **Gold Seal and Eagle** | | |
| 20-inch No. 72 | yd. | .09½ |
| 30-inch No. 72 | | .17 |
| 40-inch No. 72 | | .19 |
| **Red Seal and Cardinal** | | |
| 20-inch | yd. | .08 |
| 30-inch | | .14¾ |
| 40-inch | | .16 |
| 50-inch | | .24 |

**Osnaburgs**

| | | |
|---|---|---|
| 40-inch 2.34-yard | yd. | .09⅝ |
| 40-inch 2.48-yard | | .09 |
| 40-inch 2.56-yard | | .08⅛ |
| 40-inch 3.00-yard | | .07⅜ |
| 40-inch 7-ounce part waste | | .07 |
| 40-inch 10-ounce part waste | | .10 |
| 37-inch 2.42-yard | | .09⅛ |

**Raincoat Fabrics**

| | | |
|---|---|---|
| **Cotton** | | |
| Bombazine 60 x 64 | yd. | .07½ |
| Plaids 60 x 48 | | .10¾ |
| Surface prints 60 x 64 | | .11¾ |
| Print cloth, 38½-inch, 60 x 64 | | .04¾ |
| **Sheetings—40-Inch** | | |
| 48 x 48, 2.50-yard | yd. | .07⅜ |
| 64 x 68, 3.15-yard | | .07¼ |
| 56 x 60, 3.60-yard | | .06⅛ |
| 44 x 40, 4.25-yard | | .05 |
| **Sheetings, 36-Inch** | | |
| 48 x 48, 5.00-yard | yd. | .04¼ |
| 44 x 40, 6.15-yard | | .03½ |

**Tire Fabrics**

| | | |
|---|---|---|
| **Builder** | | |
| 17¼ ounce 60" 23/11 ply Karded peeler | lb. | .29½ |
| **Chafer** | | |
| 14 ounce 60" 20/8 ply Karded peeler | lb. | .29½ |
| 9¼ ounce 60" 10/2 ply Karded peeler | lb. | .28½ |
| **Cord Fabrics** | | |
| 23/5/3 Karded peeler, 1 1/16" cotton | lb. | .30½ |
| 15/3/3 Karded peeler, 1 1/16" cotton | lb. | .28½ |
| 23/5/3 Karded peeler, 1¼" cotton | lb. | .36 |
| 23/5/3 Combed Egyptian | lb. | .49½ |
| **Leno Breaker** | | |
| 8¼ ounce and 10¼ ounce 60" Karded peeler | lb. | .31½ |

THE accompanying table of week-end closing prices on the New York Cotton Exchange shows the week-end change of representative futures covering the past two months.

Opening at 8.29¢ per pound on December 29, the New York spot middling price moved upward to reach 8.72¢ per pound on January 11, the highest point for several months. Since then the market has been slightly easier with price variation covering a narrow range. Spot cotton closed at 8.58¢ per pound on January 25, 13 points under the high for the month. The upward movement in cotton at the beginning of the month was influenced by better exports in cotton and an improvement in sentiment in the cotton trade itself.

Sales at 13 southern markets totaled 363,685 bales during 18 days since December 27, as compared with 183,412 bales for the same days one year ago. Trading was inactive during the last days of December, but was at moderate rate during January.

According to an announcement by the Commodity Credit Corp., through January 13, loans had been made on 4,558,439 bales of cotton and represented an average loan of 8.38¢ per pound.

Farm legislation prospects brightened considerably when conferees on conflicting House and Senate bills reached an agreement on the more controversial features of the cotton section of the bill.

Consumption of all cotton in domestic mills during December reached 433,058 bales, against 484,819 in November, and 694,841 in December, 1936, according to a report of the Census Bureau.

#### Fabrics

The cloth market has been without substantial change since late December. Trading has been irregular with occasional strong days. As January is the nominal period for active trading to begin and with reports that inventories are being consistently liquidated, it is expected that a firm and gradually rising market will prevail throughout the remainder of the first quarter. Raincoat manufacturers have been limiting their buying to samples from which they will determine their spring styles.

Fabric prices remain generally steady, with only slight recessions being noted in several cases.

### New York Quotations

*(Continued from page 84)*

**Softeners (Cont'd)**

| | | |
|---|---|---|
| Plastogen | lb. | |
| Plastone | lb. | $0.30 /$0.35 |
| R-19 Resin (drums) | lb. | .10 |
| R-21 Resin (drums) | lb. | .10 |
| Reogen | lb. | |
| Rosin oil, compounded | gal. | .40 |
| RPA No. 1 | lb. | |
| No. 2 | lb. | |
| Rubtack | lb. | $0.10 |
| Tackol | lb. | .085 /$0.115 |
| Tonox | lb. | .16 |
| Powder | lb. | |
| Witco No. 20 | gal. | .20 |
| X-1 Resinous oil (tank car) | lb. | .01 |

**Softeners for Hard Rubber Compounding**

| | | |
|---|---|---|
| Resin C Pitch 55° C. M.P. | lb. | .013 / .014 |
| Resin C Pitch 70° C. M.P. | lb. | .013 / .014 |
| Resin C Pitch 85° C. M.P. | lb. | .013 / .014 |

**Solvents**

| | | |
|---|---|---|
| Beta-Trichlorethane | gal. | |
| Bondogen | lb. | |
| Carbon bisulphide | lb. | |
| tetrachloride | lb. | |
| Industrial 90% benzol (tank car) | gal. | .16 |

**Stabilizers for Cure**

| | | |
|---|---|---|
| Laurex, ton lots | lb. | |
| Stearex B | lb. | .105 / .115 |
| Beads | lb. | .095 / .105 |
| Stearic acid, single pressed | lb. | .105 / .115 |
| Stearite | 100 lbs. | 9.50 /10.50 |
| Zinc stearate | lb. | .23 |

**Synthetic Rubber**

| | | |
|---|---|---|
| Neoprene Latex Type 50 | lb. | |
| 53 | lb. | |
| 54 | lb. | |
| Type E. | lb. | |
| "Thiokol" A (f.o.b. Yardville) | lb. | .35 |
| Coating Materials | gal. | 2.50 / 5.00 |
| DX | lb. | .55 |
| Molding Powder | lb. | .50 / .75 |

**Tackifier**

| | | |
|---|---|---|
| B. R. H. No. 2 | lb. | .015 / .016 |

**Varnish**

| | | |
|---|---|---|
| Shoe | gal. | 1.45 |

**Vulcanizing Ingredients**

| | | |
|---|---|---|
| Sulphur Chloride, drums | lb. | .035 / .04 |
| Rubber | 100 lb. | 2.65 |
| Telloy | lb. | |
| Vandex | lb. | |

(See also Colors—Antimony)

**Waxes**

| | | |
|---|---|---|
| Carnauba, No. 3 chalky | lb. | .37⅜ |
| 2 N.C. | lb. | .39⅞ |
| 3 N.C. | lb. | .37⅜ |
| 1 Yellow | lb. | .4575 |
| 2 | lb. | .4425 |
| Montan, crude | lb. | .11 |

### British Malaya

An official cable from Singapore to the Malayan Information Agency, Malaya House, 57 Trafalgar Sq., London, W.C.2, England, gives the following figures for December, 1937:

Rubber Exports: Ocean Shipments from Singapore, Penang, Malacca, and Port Swettenham

| To | Sheet and Crepe Rubber Tons | Latex, Concentrated Latex, Revertex, and Other Forms of Latex Tons |
|---|---|---|
| United Kingdom | 8,179 | 245 |
| United States | 28,941 | 451 |
| Continent of Europe | 12,217 | 445 |
| British possessions | 1,760 | 75 |
| Japan | 3,970 | 27 |
| Other countries | 470 | 11 |
| Totals | 55,537 | 1,254 |

Rubber Imports: Actual, by Land and Sea

| From | Dry Rubber Tons | Wet Rubber (Dry) Weight) Tons |
|---|---|---|
| Sumatra | 4,426 | 695 |
| Dutch Borneo | 1,495 | 55 |
| Java and other Dutch islands | 161 | 1 |
| Sarawak | 2,494 | 664 |
| British Borneo | 324 | 19 |
| Burma | 742 | 45 |
| Siam | 1,885 | 274 |
| French Indo-China | 354 | 171 |
| Other countries | 132 | 12 |
| Totals | 12,103 | 1,936 |

# IMPORTS, CONSUMPTION, AND STOCKS

## United States and World Statistics of Rubber Imports, Exports, Consumption, and Stocks

| Twelve Months | U. S. Imports* Tons | U. S. Consumption¶ Tons | U. S. Stocks Mfgrs. Importers, Dealers, Etc.† Tons | U. S. Stocks Afloat† Tons | U. K.— Public Warehouses, London, Liverpool†‡ Tons | Singapore and Penang Dealers and Port Stocks†‡ Tons | World Production (Net Exports)‡ Tons | World Consumption Estimated‡ Tons | World Stocks†‡§ Tons |
|---|---|---|---|---|---|---|---|---|---|
| 1935 ..... | 448,116 | 491,544 | 303,000 | 39,094 | 164,295 | 28,304 | 872,600 | 939,320 | 650,494 |
| 1936 ..... | 490,858 | 575,000 | 223,000 | 56,567 | 78,462 | 26,969 | 855,627 | 1,044,218 | 464,186 |
| 1937 | | | | | | | | | |
| January ... | 32,820 | 50,818 | 204,201 | 55,096 | 71,062 | 36,365 | 71,540 | **92,918 | 422,426 |
| February .. | 43,289 | 51,887 | 195,080 | 53,538 | 63,760 | 42,132 | 70,539 | 93,017 | 407,807 |
| March .... | 52,039 | 54,064 | 191,928 | 56,994 | 52,077 | 42,485 | 102,428 | 104,347 | 445,722 |
| April ..... | 35,850 | 51,797 | 174,934 | 72,530 | 48,748 | 38,812 | 89,611 | 93,457 | 401,027 |
| May ...... | 50,840 | 51,733 | 172,985 | 58,542 | 46,628 | 34,234 | 87,030 | 101,219 | 386,403 |
| June ..... | 48,956 | 51,798 | 169,646 | 57,215 | 43,427 | 45,085 | 96,111 | 101,789 | 414,990 |
| July ...... | 39,108 | 43,650 | 164,445 | 75,779 | 42,175 | 44,759 | 112,374 | 89,705 | 408,783 |
| August ... | 48,785 | 41,456 | 171,052 | 80,439 | 45,211 | 47,873 | 102,686 | 89,864 | 417,082 |
| September.. | 56,049 | 43,893 | 182,556 | 83,288 | 49,807 | 49,438 | 106,989 | 91,718 | 457,203 |
| October ... | 52,508 | 38,707 | 195,685 | 80,653 | 51,932 | 41,948 | 100,289 | 82,964 | 456,676 |
| November . | 56,302 | 33,984 | 217,586 | 81,302 | 54,857 | 38,803 | 93,987 | 75,336 | 468,532 |
| December . | 68,305 | 29,160 | 256,618 | 63,099 | ...... | ...... | ...... | ...... | ...... |

* Including liquid latex. †Stocks on hand the last of the month or year. ‡Statistical Bulletin of the International Rubber Regulation Committee. §Stocks at U. S. A., U. K., Singapore and Penang, Para, Manaos, and afloat. ¶Corrected to 100% from estimate of reported coverage. **Not including additional absorption from U.K. manufacturers' stocks for any month during 1937. The figure will be included in yearly total.

CRUDE rubber consumption by United States manufacturers during 1937 is estimated at 542,947 long tons, according to R. M. A. statistics, against 575,000 (revised) long tons consumed during 1936. December consumption is set at 29,160 long tons, compared with 33,984 long tons for November and 49,754 long tons for December, 1936.

Gross imports of crude rubber for 1937 are reported at 584,851 long tons, contrasted with 1936 imports of 490,859 long tons. Gross imports for December are estimated at 68,305 long tons, against 56,302 long tons for November and 57,049 long tons for December, 1936.

Domestic stocks of crude rubber on hand December 31 totaled 256,618 long tons, compared with 217,586 long tons on hand November 30 and 223,000 long tons on hand December 31, 1936.

Crude rubber afloat to United States ports as of December 31 is figured to be 63,099 long tons, against 81,302 long tons afloat on November 30 and 56,567 long tons afloat on December 31, 1936.

### London and Liverpool Stocks

| Week Ended | London (Tons) | Liverpool (Tons) |
|---|---|---|
| January 1............ | 35,810 | 22,008 |
| January 8............ | 36,976 | 21,820 |
| January 15............ | 37,939 | 21,782 |
| January 22............ | 39,284 | 21,561 |

# RUBBER SCRAP

DEMAND for scrap was poor during the past month as reclaimers have further curtailed operations. The scrap market was steady in general during January, as influenced by the stability of crude rubber. Small price recessions, however, were noted in some cases. No. 1 floating tubes dropped ¾¢ per pound, and mixed tubes were off ⅛ to ¼¢ per pound. Two tire grades showed reductions of $1.50 to $2 per ton; white druggists' sundries were off ⅛¢ per pound; and two hose grades receded $1 per ton. Hard rubber scrap dropped ⅛ to ¼¢ per pound. Other quotations remained steady.

### CONSUMERS' BUYING PRICES

(Carload Lots Delivered Eastern Mills)
January 19, 1938

| | | Prices |
|---|---|---|
| **Boots and Shoes** | | |
| Boots and shoes, black..... | *lb.* | $0.01⅛/$0.01¼ |
| Colored ................ | *lb.* | .00¾/ .00⅞ |
| Untrimmed arctics ......... | *lb.* | .00¾/ .00⅞ |
| **Inner Tubes** | | |
| No. 1, floating ............ | *lb.* | .09¾/ .10¼ |
| No. 2, compound.......... | *lb.* | .04½/ .04¾ |
| Red ...................... | *lb.* | .04¼/ 04½ |
| Mixed tubes .............. | *lb.* | .03⅞/ .04 |
| **Tires (Akron District)** | | |
| Pneumatic Standard | | |
| Mixed auto tires with beads ............. | *ton* | 13.50 /14.00 |
| Beadless ............ | *ton* | 18.50 /19.00 |
| Auto tire carcass....... | *ton* | 17.00 /18.00 |
| Black auto peelings..... | *ton* | 24.00 /25.00 |
| Solid | | |
| Clean mixed truck...... | *ton* | 28.00 /29.00 |
| Light gravity .......... | *ton* | 42.00 /43.00 |
| **Mechanicals** | | |
| Mixed black scrap........ | *ton* | 22.00 /24.00 |
| Hose, air brake .......... | *ton* | 26.00 /28.00 |
| Garden, rubber covered. | *ton* | 13.00 /14.00 |
| Steam and water, soft.. | *ton* | 13.00 /14.00 |
| No. 1 red................. | *lb.* | .03 / .03¼ |
| No. 2 red................. | *lb.* | .02¾/ .03 |
| White druggists' sundries.. | *lb.* | .04⅛/ .04¼ |
| Mechanical ............... | *lb.* | .01¾/ .02 |
| **Hard Rubber** | | |
| No. 1 hard rubber......... | *lb.* | .12½/ .13⅛ |

# RECLAIMED RUBBER

CONSUMPTION of reclaimed rubber during 1937 is estimated at 157,990 long tons, as compared with 141,486 long tons during 1936; reclaim production during 1937 is estimated at 178,776 long tons, against 150,571 long tons during 1936, according to the R. M. A. Figures from the same source estimate December reclaimed rubber consumption at 7,674 long tons; production 10,815 long tons; and stocks on hand December 31, 26,260 long tons. Consumption of reclaim during November totaled 9,703 tons, constituting 28.6% of crude consumption. In keeping with the general conditions, demand for reclaim remained inactive during January, resulting in a somewhat further curtailment of production.

The market is somewhat easier with No. 1 floating tube off ½ to ¾¢ per pound and mechanical blends down ¼¢ per pound. Compounded tubes are up ¼¢ per pound; while other prices remain steady.

### New York Quotations

January 19, 1938

| | Sp. Grav. | ¢ per lb. |
|---|---|---|
| **Auto Tire** | | |
| Black Select ......... | 1.16-1.18 | 6¼/ 6½ |
| Acid ................. | 1.18-1.22 | 7¼/ 7½ |
| **Shoe** | | |
| Standard ............ | 1.56-1.60 | 7 / 7¼ |
| **Tubes** | | |
| No. 1 Floating........ | 1.00 | 14 /14¼ |
| Compounded .......... | 1.10-1.12 | 9 / 9¼ |
| Red Tube ............ | 1.15-1.30 | 9 / 9½ |
| **Miscellaneous** | | |
| Mechanical Blends ... | 1.25-1.50 | 4¾/ 5 |
| White ................ | 1.35-1.50 | 13 /13½ |

The above list includes those items or classes only that determine the price basis of all derivative reclaim grades. Every manufacturer produces a variety of special reclaims in each general group separately featuring characteristic properties of quality, workability, and gravity at special prices.

## United States Reclaimed Rubber Statistics—Long Tons

| Year | Production | Consumption† | Consumption % to Crude | U. S. Stocks* | Exports |
|---|---|---|---|---|---|
| 1935 ........................ | 122,140 | 113,530 | 22.9 | 25.069 | 5,383 |
| 1936 ........................ | 150.571 | 141.486 | 24.6 | 19.000 | 7,085 |
| 1937 | | | | | |
| January .................... | 15,129 | 14,450 | 28.4 | 18,822 | 857 |
| February .................. | 15,192 | 14,578 | 28.1 | 18,490 | 946 |
| March ...................... | 14,462 | 15,601 | 28.9 | 16.450 | 901 |
| April ....................... | 13,884 | 15,607 | 30.1 | 14,046 | 1,140 |
| May ......................... | 15,793 | 14,693 | 28.4 | 14,647 | 890 |
| June ........................ | 16,052 | 14,414 | 27.8 | 14,535 | 1,077 |
| July ........................ | 16,241 | 12,128 | 27.3 | 17,682 | 1,221 |
| August ..................... | 16,543 | 13,227 | 31.9 | 19,706 | 1,240 |
| September .................. | 16.410 | 13,681 | 31.2 | 21,597 | 1,152 |
| October .................... | 15,849 | 12,234 | 31.6 | 23,752 | 1,621 |
| November .................. | 12,406 | 9,703 | 28.6 | 24,620 | 1,385 |
| December .................. | 10,815 | 7,674 | 26.3 | 26,260 | .... |

*Stocks on hand the last of the month or year. †Corrected to 100% from estimate of reported coverage.
*Compiled by The Rubber Manufacturers Association, Inc.*

# CLASSIFIED ADVERTISEMENTS

ALL CLASSIFIED ADVERTISING MUST BE PAID IN ADVANCE

| GENERAL RATES | SITUATIONS WANTED RATES | SITUATIONS OPEN RATES |
|---|---|---|
| Light face type $1.00 per line (ten words) | Light face type 40c per line (ten words) | Light face type 75c per line (ten words) |
| Bold face type $1.25 per line (eight words) | Bold face type 55c per line (eight words) | Bold face type $1.00 per line (eight words) |

*Allow nine words for keyed address.* *Replies forwarded without charge.*

## SITUATIONS WANTED

LATEX CHEMIST, NOW EMPLOYED AT DEVELOPMENT, COMpounding, and control, desires change. Full particulars to interested concern. Address Box No. 919, care of INDIA RUBBER WORLD.

SALESMAN: MECHANICAL RUBBER. METROPOLITAN NEW YORK territory. Experienced. Address Box No. 920, care of INDIA RUBBER WORLD.

CHEMIST, B.S. CHEM., ENGR., 10 YEARS' EXPERIENCE COMpounding, development, production supervision tires, tubes, bicycle tires, balls, mechanicals. Now employed. Best of reasons for desiring change. Address Box No. 924, care of INDIA RUBBER WORLD.

LATEX CHEMIST, SEVERAL YEARS' EXPERIENCE ON LATEX products. Excellent references. Address Box No. 925, care of INDIA RUBBER WORLD.

SUPERINTENDENT, NOW EMPLOYED, DESIRES CHANGE. Eighteen years' experience in manufacturing mechanical rubber goods, sponge rubber and synthetic rubber products. Age thirty-nine. Can draw up manufacturing specifications, make estimates, develop new products and compound for sponge rubber, synthetic, or ordinary rubber goods. University education in chemical and mechanical engineering. Can organize and handle labor efficiently. Address Box No. 926, care of INDIA RUBBER WORLD.

EXPERIENCED RUBBER FOOTWEAR DESIGNER, DEVELOPING, and Pattern Maker, based on twenty-one years of practical experience, desires position as Developing Manager, Assistant Superintendent, Superintendent, or Production Manager. Canadian born, Canadian employed, Married, can speak two languages, German and English. All correspondence strictly confidential. Address Box No. 927, care of INDIA RUBBER WORLD.

**LATEX TECHNOLOGIST 10 YRS.' EXPERIENCE theoretical and applied latex chemistry. Specialist in dipped goods, galoshes, coated fabrics, adhesives for shoe and auto industry, expansion joints, latex molds, latex sponge, sprayed protective coatings, etc. Designer of entire dipping units. Presently employed chief chemist and technical supervisor. Address Box No. 928, care of INDIA RUBBER WORLD.**

SALESMAN, 31, HEADQUARTERS CLEVELAND, FIVE STATES department stores, jobber trade to represent molded rubber goods manufacturer. Address Box No. 929, care of INDIA RUBBER WORLD.

## SITUATIONS OPEN

GRADUATE CHEMIST FAMILIAR WITH RUBBER COMPOUNDing. Good opportunity for advancement. Location New York area. State full experience and salary. Address Box No. 921, care of INDIA RUBBER WORLD.

WANTED: HOSE ROOM FOREMAN FOR MECHANICAL RUBBER plant. Experienced hand made heavy hose and wrapped machine hose. State age, experience, salary wanted, etc., in first letter. Address Box No. 923, care of INDIA RUBBER WORLD.

## BUSINESS OPPORTUNITIES

THE PROPRIETORS OF U. S. A. PATENT NO. 2,051,940 RELATing to rubber buckets are prepared to either grant licenses for manufacture and sale of this article or would be prepared to sell the rights for a reasonable amount. Address inquiries to: H. G. Miles, Ltd., Works Road, Letchworth, Hertfordshire, England.

FOR SALE: SMALL RUBBER PLANT, FOR MOLDED GOODS, located in Fremont, Ohio. Address S. Surdyk, 346 Lime St., Fremont, Ohio.



(*Advertisements continued on page* 91)

## Proportionate Tire Value

Although the average price of crude rubber in 1937 was up 584% and the average price of cotton throughout the year was up 100% since the approximate low point of the depression in 1932, the average price of tires has increased only 32%, according to The Rubber Manufacturers Association, Inc., which recently completed a survey of the tire industry. Besides, wages in the tire industry rose 50% in the same period and are the highest paid by any mass production industry, according to the Bureau of Labor Statistics. Similarly, other important cost factors, as overhead, selling and distribution expense, and especially taxes, have also increased sharply.

As a result of unremitting research and improved methods of manufacture, the industry today produces tires that run ten times as many miles as those a quarter century ago, cost only one-quarter as much, and give infinitely more comfortable transportation with less tire trouble.

Production of automobile tires in the United States during the first eleven months of 1937 was 52,313,000 units, against 52,805,000 units for the same period in 1936, and 38,102,000 units for this period in 1932.

## Tire Statistics

Shipments of pneumatic casings during the third quarter of 1937, estimated at 13,590,949, were 16.7% under shipments made during the second quarter of 1937 and 6.6% under shipments for the third quarter of 1936, according to R. M. A. statistics.

Production of pneumatic casings for the third quarter of 1937 is estimated at 12,658,848 units, a decrease of 22.9% under the second quarter production and 18.2% under production during the third quarter of 1936.

Pneumatic casings in the hands of manufacturers September 30, 1937, are estimated at 11,615,262 units, 7.3% under the stocks on hand June 30, but 28.9% above the stocks on hand September 30, 1936.

The actual figures are:

PNEUMATIC CASINGS

| | Shipments | Production | Inventory |
|---|---|---|---|
| Third Quarter —1937 | 13,590,949 | 12,658,848 | 11,615,262 |
| Second Quarter —1937 | 16,324,381 | 16,420,746 | 12,528,789 |
| First Nine Months—1937 | 44,582,251 | 45,221,237 | ........ |
| Third Quarter —1936 | 14,557,480 | 15,466,388 | 9,011,542 |
| First Nine Months—1936 | 42,032,069 | 42,707,585 | ........ |

## Tire Taxes Down

Recent reports indicate federal excise tax receipts for tires and inner tubes showed a sharp decline in November, when the figure for tires was $1,676,400, against $2,953,200 in October and $2,437,100 in November, 1936. While December data are not yet available, it is certain that figures for the final quarter of 1937 will be well under the industry's average for the period since the tax became effective in 1932. In December, 1936, the tax on tires amounted to $3,319,000.

For the first quarter last year the tax totaled $8,418,000, against $6,154,300 in the preceding year; second quarter, $8,176,800, against $8,238,400 in 1936; and third quarter, $9,128,100, against $9,951,100 in 1936. For 1936 the tax on tires was $30,837,400 and on inner tubes, $6,404,000; the respective figures for 1933 were $19,816,500 and $4,019,500.

## Anti-Freeze Tractor Tire

Super Pyro, U.S.I.'s anti-freeze, is now being used in tractor tires. Farmers like to break up their ground before the final thaw by running heavy tractors over it. Added weight is secured by filling the tires with water. To prevent this water from freezing, a 50-50 mixture of Super Pyro is used. Where ballast is needed for additional traction in winter use, an anti-freeze is required with or without water in the tires.

## Rims Approved by The Tire & Rim Association, Inc.

| Rim Size | 12 Mos., 1937 No. | 12 Mos., 1937 % | 12 Mos., 1936 No. | 12 Mos., 1936 % |
|---|---|---|---|---|
| **Drop Center Rims, 16" Diameter and Under** | | | | |
| 15x5.50E | ...... | .. | 1,532 | 0.0 |
| 16x4.00D | 13,367 | 0.1 | 5,758 | 0.0 |
| 16x4.25D | 277,238 | 1.2 | 304,987 | 1.5 |
| 16x4.50D | 518 | 0.0 | 37,236 | 0.2 |
| 16x6.00E | ...... | .. | 77 | 0.0 |
| 15x3.00D | 100,336 | 0.5 | 40,984 | 0.2 |
| 15x5.00F | 931 | 0.0 | 12,415 | 0.1 |
| 15x5.50F | 339,816 | 1.5 | 201,024 | 1.0 |
| 16x3.00D | ...... | .. | 385 | 0.0 |
| 16x3.50D | 1,687,015 | 7.6 | 240,120 | 1.2 |
| 16x4.00E | 9,320,769 | 41.4 | 8,374,364 | 40.3 |
| 16x4.25E | 1,132,033 | 5.1 | 556,641 | 2.7 |
| 16x4.50E | 3,528,433 | 15.9 | 2,948,674 | 14.2 |
| 16x5.00F | 1,086,990 | 4.9 | 917,487 | 4.4 |
| 16x5.50F | 138,272 | 0.6 | 94,882 | 0.4 |
| 16x6.00F | 25,945 | 0.1 | 99,055 | 0.5 |
| **Semi-Drop Center Rims, 16" Diameter** | | | | |
| 16x4.50E | 40,447 | 0.2 | 37,236 | 0.2 |
| 16x5.50F | 141,018 | 0.6 | ...... | .. |
| **Drop Center Rims, 17" Diameter and Over** | | | | |
| 17x3.00D | 8,435 | 0.0 | 111,544 | 0.5 |
| 17x3.25E | 45,347 | 0.2 | 520,277 | 2.6 |
| 17x3.62F | 50,408 | 0.2 | 2,185,158 | 10.5 |
| 17x4.00F | 356 | 0.0 | 14,859 | 0.1 |
| 17x4.19F | 959 | 0.0 | 4,263 | 0.0 |
| 17x5.00F | 6,274 | 0.0 | 5,020 | 0.0 |
| 18x2.15B | 34,541 | 0.2 | 55,971 | 0.3 |
| 18x3.00D | 5,205 | 0.0 | 5,680 | 0.0 |
| 18x3.25E | 10,499 | 0.0 | 9,603 | 0.0 |
| 18x3.62F | 53,504 | 0.2 | 7,428 | 0.0 |
| 18x4.00F | 4,760 | 0.0 | 1,221 | 0.0 |
| 18x4.19F | 22,370 | 0.1 | 20,406 | 0.1 |
| 19x2.15B | 3,224 | 0.0 | 5,918 | 0.0 |
| 19x3.00D | 2,703 | 0.0 | 16,430 | 0.1 |
| 19x3.25E | 915 | 0.0 | 17,603 | 0.1 |
| 19x3.62F | 12,414 | 0.1 | ...... | .. |
| 20x3.25E | 12,963 | 0.1 | 17,507 | 0.1 |
| 21x3.25E | 15,613 | 0.1 | 6,577 | 0.0 |
| 22x3.25E | 986 | 0.0 | ...... | .. |
| **Flat Base Passenger Rims** | | | | |
| All Sizes | 28,603 | 0.2 | 61,294 | 0.3 |
| **High Pressure Rims** | | | | |
| All Sizes | 1,463 | 0.0 | 1,273 | 0.0 |
| **15" Truck Rims** | | | | |
| 15x7 | 4,954 | 0.0 | 5,833 | 0.0 |
| 15x8 | 2,052 | 0.0 | 1,135 | 0.0 |
| **17" Truck Rims** | | | | |
| 17x5 | 3,354 | 0.0 | ...... | .. |
| 17x6 | 76,145 | 0.3 | ...... | .. |
| **18" Truck Rims** | | | | |
| 18x5 | ...... | .. | 885 | 0.0 |
| 18x6 | 9,396 | 0.0 | 3,738 | 0.0 |
| 18x7 | 43,661 | 0.2 | 40,007 | 0.2 |
| 18x8 | 12,182 | 0.1 | 3,435 | 0.0 |
| 18x9/10 | 7,376 | 0.0 | 3,170 | 0.0 |
| **20" Truck Rims** | | | | |
| 20x5 | 1,087,942 | 4.9 | 1,329,651 | 6.4 |
| 20x6 | 1,726,448 | 7.8 | 1,602,857 | 7.7 |
| **20" Truck Rims** | | | | |
| 20x7 | 486,262 | 2.2 | 438,279 | 2.1 |
| 20x8 | 177,948 | 0.8 | 171,437 | 0.9 |
| 20x9/10 | 31,914 | 0.1 | 20,916 | 0.1 |
| 20x10.50 | .... | .. | 688 | 0.0 |
| 20x11 | 2,973 | 0.0 | 2,192 | 0.0 |
| **22" Truck Rims** | | | | |
| 22x7 | 355 | 0.0 | 357 | 0.0 |
| 22x8 | 18,268 | 0.1 | 17,761 | 0.1 |
| 22x9/10 | 5,801 | 0.0 | 7,503 | 0.0 |
| **24" Truck Rims** | | | | |
| 24x5 | 101 | 0.0 | 313 | 0.0 |
| 24x6 | 5,649 | 0.0 | 2,851 | 0.0 |
| 24x7 | 6,752 | 0.0 | 12,971 | 0.1 |
| 24x8 | 13,382 | 0.1 | 19,608 | 0.1 |
| 24x9/10 | 15,610 | 0.1 | 12,499 | 0.1 |
| 24x11 | 4,517 | 0.0 | 3,696 | 0.0 |
| **Drop Center Tractor Rims** | | | | |
| 20x8.00T | 52 | 0.0 | ...... | .. |
| 24x6.00S | 21,163 | 0.1 | 5,364 | 0.0 |
| 24x8.00T | 70,608 | 0.3 | 49,191 | 0.2 |
| 28x6.00S | 4,236 | 0.0 | 2,756 | 0.0 |
| 28x8.00T | 64,761 | 0.3 | 34,056 | 0.2 |
| 32x6.00S | ...... | .. | 1,052 | 0.0 |
| 32x8.00T | 7,974 | 0.0 | 3,583 | 0.0 |
| 36x6.00S | 63,309 | 0.3 | 55,258 | 0.3 |
| 36x8.00T | 52,729 | 0.2 | 9,846 | 0.0 |
| 40x6.00S | 22,841 | 0.1 | 6,956 | 0.0 |
| 40x8.00T | 5 | 0.0 | 375 | 0.0 |
| 42x8.00T | 416 | 0.0 | ...... | .. |
| 44x8.00T | 819 | 0.0 | 426 | 0.0 |
| 12x3.00D | 4,495 | 0.0 | ...... | .. |
| 16x3.00D | 355 | 0.0 | ...... | .. |
| 18x3.00D | 652 | 0.0 | ...... | .. |
| 18x5.50F | 6,911 | 0.0 | ...... | .. |
| 19x3.00D | 307 | 0.0 | ...... | .. |
| 20x4.50E | 10,014 | 0.0 | 1,030 | 0.0 |
| 20x5.00F | ...... | .. | 21 | 0.0 |
| 20x5.50F | 5,557 | 0.0 | ...... | .. |
| 21x3.00D | 3,041 | 0.0 | ...... | .. |
| 22x4.50E | 1,761 | 0.0 | ...... | .. |
| 24x5.50F | 577 | 0.0 | ...... | .. |
| 28x4.00E | 28 | 0.0 | ...... | .. |
| 36x3.00D | 1,417 | 0.0 | 607 | 0.0 |
| 36x4.50E | 1,844 | 0.0 | 577 | 0.0 |
| 40x4.50E | 17 | 0.0 | ...... | .. |
| **Cast Rims** | | | | |
| 10x5.00F | 2,783 | 0.0 | 2,019 | 0.0 |
| 10x6.00F | 1,052 | 0.0 | 585 | 0.0 |
| 15x2.50D | 166 | 0.0 | ...... | .. |
| 24x15Y | 410 | 0.0 | 508 | 0.0 |
| **Clincher Rims** | | | | |
| All Sizes | 6,723 | 0.0 | 8,957 | 0.0 |
| **Airplane** | | | | |
| All Sizes | 3,229 | 0.0 | 1,590 | 0.0 |
| Totals | 22,257,964 | .. | 20,827,428 | .. |

# Classified Advertisements

Continued

## MACHINERY AND SUPPLIES FOR SALE

FOR SALE: COMPLETE LINE OF USED RUBBER EQUIPMENT including mills, calenders, hydraulic presses, vulcanizers, Banbury mixers, driers, etc. Send for complete list. CONSOLIDATED PRODUCTS CO., INC., 13-16 Park Row, New York, N. Y.

## MACHINERY AND SUPPLIES WANTED

WANTED: HYDRAULIC TIRE VULCANIZER ABOUT 5 FEET IN diameter and 5 feet deep with a hydraulic ram of 2,000 pounds' pressure. Address Box No. 922, care of INDIA RUBBER WORLD.

## Rubber Goods Production Statistics

| | | 1937 Oct. | 1936 Oct. |
|---|---|---|---|
| Tires and Tubes* | | .... | .... |
| MISCELLANEOUS PRODUCTS | | | |
| **Single and double texture proofed fabrics** | | | |
| Production | *thous. of yds.* | 3,282 | 4,650 |
| **Rubber and canvas footwear** | | | |
| Production, total | *thous. of prs.* | 6,369 | 6,751 |
| Tennis | *thous. of prs.* | 1,447 | 1,280 |
| Waterproof | *thous. of prs.* | 4,922 | 5,471 |
| Shipments, total | *thous. of prs.* | 6,635 | 7,897 |
| Tennis | *thous. of prs.* | 769 | 796 |
| Waterproof | *thous. of prs.* | 5,866 | 7,102 |
| Shipments, domestic, total | *thous. of prs.* | 6,582 | 7,844 |
| Tennis | *thous. of prs.* | 749 | 751 |
| Waterproof | *thous. of prs.* | 5,833 | 7,093 |
| Stocks, total, end of month | *thous. of prs.* | 19,780 | 13,430 |
| Tennis | *thous. of prs.* | 6,109 | 3,780 |
| Waterproof | *thous. of prs.* | 13,671 | 9,651 |

*Monthly data no longer available.

The above figures have been adjusted to represent 100% of the industry based on reports received which represented 81% for 1936-37.

Source: *Survey of Current Business*, Bureau of Foreign & Domestic Commerce, Washington, D. C.

## Foreign Trade Information

*For further information concerning the inquiries listed below address United States Department of Commerce, Bureau of Foreign and Domestic Commerce, Room 734, Custom House, New York, N. Y.*

| No. | Commodity | City and Country |
|---|---|---|
| *4,946 | Automobile accessories and parts | Santiago, Chile |
| *4,947 | Rubber belting | Alexandria, Egypt |
| *4,949 | Mechanical rubber goods | Calcutta, India |
| ‡4,971 | Tires and tubes | Warsaw, Poland |
| *4,978 | Toys and roller skates | Mexico City, Mexico |
| *4,980 | Combs | Manila, P. I. |
| †4,992 | Bicycle and tire manufacturing machinery | Lahore, India |
| ‡4,999 | Waxes for rubber uses | Prague, Czechoslovakia |
| †5,000 | Automobile accessories | St. Annes-on-Sea, England |
| *5,001 | Airplane accessories and parts | Rio de Janeiro, Brazil |
| *5,004 | Druggists' sundries | Bombay, India |
| ‡5,015 | Belting | Vienna, Austria |
| *5,027 | Stationery supplies | Cairo, Egypt |
| ‡5,029 | Sanitary goods, stationery supplies, and novelties | Winnipeg, Canada |
| ‡5,039 | Elastic fabric | Prague, Czechoslovakia |
| †5,048 | Automobile accessories | St. Nicklaas-Waas, Belgium |
| †5,069 | Novelties | Brussels, Belgium |
| *5,072 | Toys and games | Doorn, Netherlands |
| *5,076 | Garden hose | Kingston, Jamaica |

*Agency. †Purchase. ‡Purchase and agency.

## World Net Imports of Crude Rubber

| Year | U.S.A. | U.K.† | Australia | Belgium | Canada | Czecho-slovakia | France | Germany | Italy | Japan | Russia | Rest of the World | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1935 | 455,800 | 175,100 | 10,000 | 7,600 | 26,900 | 11,200 | 52,300 | 62,900 | 25,400 | 57,600 | 37,600 | 59,100 | 935,200 |
| 1936 | 475,361 | 62,676 | 14,423 | 9,627 | 27,867 | 8,772 | 56,777 | 71,793 | 15,998 | 61,701 | 30,967 | 64,647 | 831,148 |
| 1937 | | | | | | | | | | | | | |
| Jan. | 42,655 | 3,855 | 590 | 854 | 1,632 | 567 | 4,701 | 7,041 | 1,762 | 8,298 | 2,633 | 5,959 | 76,450 |
| Feb. | 44,398 | 6,081 | 331 | 1,363 | 1,271 | 837 | 5,276 | 7,911 | 1,477 | 6,605 | 3,048 | 5,068 | 77,363 |
| Mar. | 39,888 | 7,197 | 1,293 | 1,641 | 2,612 | 601 | 5,130 | 7,668 | 1,999 | 6,914 | 3,598 | 6,172 | 77,859 |
| Apr. | 42,066 | 9,871 | 1,058 | 1,069 | 1,343 | 1,445 | 5,302 | 8,664 | 1,589 | 5,808 | 1,532 | 5,843 | 79,527 |
| May | 48,506 | 8,488 | 1,287 | 2,113 | 4,187 | 925 | 5,619 | 6,706 | 2,745 | 8,597 | 1,886 | 6,244 | 94,915 |
| June | 48,972 | 10,437 | 2,258 | 1,630 | 3,790 | 1,150 | 6,022 | 6,469 | 1,745 | 7,608 | 3,940 | 6,127 | 94,868 |
| July | 43,018 | 13,854 | 1,959 | 851 | 1,946 | 754 | 4,315 | 7,860 | 2,662 | 4,869 | 2,150 | 5,865 | 86,877 |
| Aug. | 49,485 | 18,483 | 2,114 | 1,013 | 3,506 | 1,692 | 4,499 | 8,752 | 2,447 | 4,411 | 1,226 | 5,553 | 100,455 |
| Sept. | 56,685 | 16,654 | 3,104 | 1,258 | 2,396 | 1,369 | 4,830 | 10,595 | 1,941 | 3,671 | 1,391 | 5,578 | 108,489 |
| Oct. | 52,926 | 15,091 | 2,510 | 966 | 5,998 | 988 | 4,281 | 8,076 | 939 | 2,060 | 2,500* | 5,421 | 98,563 |

*Estimate. †U.K. figures show gross imports, not net imports. Source: *Statistical Bulletin of the International Rubber Regulation Committee.*

## Shipments of Crude Rubber from Producing Countries

| Year | Malaya including Brunei and Labuan | N.E.I. | Ceylon | India | Burma | North Borneo | Sarawak | Siam | French Indo-China | Total | Philippines and Oceania | Africa | South America | Mexican Guayule | Grand Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1935 | 417,000 | 282,900 | 54,300 | 9,100 | 4,900 | 8,900 | 19,300 | 28,300 | 28,700 | 853,400 | 1,500* | 5,000 | 12,200 | 500 | 872,600 |
| 1936 | 353,667 | 309,630 | 49,685 | 8,648 | 5,859 | 8,177 | 21,013 | 34,578 | 40,769 | 832,026 | 1,619* | 6,122 | 14,632 | 1,228 | 855,627 |
| 1937 | | | | | | | | | | | | | | | |
| Jan. | 24,746 | 27,132 | 4,514 | 487 | 579 | 1,234 | 4,015 | 3,849 | 2,823 | 69,379 | 80 | 635 | 1,286 | 160 | 71,540 |
| Feb. | 24,138 | 26,770 | 5,603 | 1,033 | 843 | 790 | 2,015 | 3,554 | 3,081 | 67,827 | 180 | 537 | 1,789 | 206 | 70,539 |
| Mar. | 40,138 | 40,929 | 7,049 | 885 | 1,149 | 1,239 | 1,425 | 3,873 | 3,160 | 99,847 | 181 | 472 | 1,792 | 136 | 102,428 |
| Apr. | 41,696 | 33,136 | 3,419 | 627 | 559 | 783 | 2,960 | 1,899 | 2,098 | 87,177 | 124 | 574 | 1,546 | 190 | 89,611 |
| May | 33,929 | 38,828 | 4,607 | 445 | 562 | 778 | 742 | 2,238 | 2,888 | 85,017 | 98 | 676 | 1,057 | 182 | 87,030 |
| June | 31,376 | 47,387 | 5,149 | 662 | 430 | 813 | 1,890 | 2,933 | 3,673 | 94,313 | 117 | 621 | 915 | 145 | 96,111 |
| July | 45,900 | 44,240 | 6,279 | 703 | 263 | 1,414 | 2,543 | 3,175 | 5,563 | 110,080 | 111 | 872 | 940 | 371 | 112,374 |
| Aug. | 43,284 | 40,838 | 7,308 | 471 | 134 | 1,189 | 1,624 | 2,999 | 2,277 | 100,124 | 187 | 726 | 1,314 | 335 | 102,683 |
| Sept. | 48,515 | 38,449 | 5,804 | 944 | 148 | 969 | 2,659 | 3,173 | 4,131 | 104,792 | 140 | 668 | 1,060 | 329 | 106,989 |
| Oct. | 47,586 | 34,416 | 6,702 | 994 | 254 | 1,505 | 523 | 2,352 | 3,753 | 98,085 | 200* | 600* | 1,204 | 200* | 100,289 |
| Nov. | 45,598 | 29,102 | 4,391 | 1,240 | 907 | 1,327 | 2,517 | 2,549 | 4,556 | 92,187 | 200* | 600* | 800 | 200* | 93,987 |

*Estimate. Source: *Statistical Bulletin of the International Rubber Regulation Committee.*

## U. S. Crude and Waste Rubber Imports for 1937

| | Plantations | Latex | Paras | Africans | Centrals | Guayule | Manicoba and Matto Grosso | Totals 1937 | Totals 1936 | Balata | Miscellaneous | Waste |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Jan. ...tons | 30,674 | 1,171 | 625 | 167 | 23 | 160 | .. | 32,820 | 31,291 | 13 | 383 | 201 |
| Feb. | 40,326 | 2,100 | 717 | 15 | 2 | 129 | .. | 43,289 | 35,219 | 37 | 1,300 | 217 |
| Mar. | 48,367 | 2,117 | 1,285 | 47 | 11 | 212 | .. | 52,039 | 37,451 | 21 | 894 | 572 |
| Apr. | 33,147 | 1,683 | 734 | 79 | 17 | 190 | .. | 35,850 | 40,370 | 6 | 283 | 99 |
| May | 48,196 | 1,809 | 612 | 46 | 2 | 175 | .. | 50,840 | 35,598 | 44 | 669 | 868 |
| June | 45,680 | 2,678 | 318 | 70 | 22 | 188 | .. | 48,956 | 41,835 | 47 | 641 | 374 |
| July | 36,315 | 2,154 | 140 | 75 | 11 | 413 | .. | 39,108 | 35,881 | 44 | 726 | 307 |
| Aug. | 46,627 | 1,460 | 120 | 283 | 2 | 293 | .. | 48,785 | 42,562 | 14 | 513 | 266 |
| Sept. | 53,942 | 1,395 | 229 | 146 | 8 | 329 | .. | 56,049 | 48,386 | 55 | 738 | 72 |
| Oct. | 49,915 | 2,085 | 266 | 31 | 41 | 170 | .. | 52,508 | 40,920 | 58 | 524 | 197 |
| Nov. | 53,729 | 1,744 | 272 | 174 | 39 | 344 | .. | 56,302 | 44,296 | 39 | 639 | 128 |
| Dec. | 66,603 | 1,194 | 289 | 70 | 10 | 139 | .. | 68,305 | 57,049 | 85 | 734 | 22 |
| Total 12 mos., 1937 ...tons | 553,521 | 21,590 | 5,607 | 1,203 | 188 | 2,742 | .. | 564,851 | ..... | 463 | 8,044 | 3,323 |
| Total 12 mos., 1936 ...tons | 467,659 | 16,418 | 4,014 | 1,049 | 490 | 1,228 | .. | ...... | 490,858 | 958 | 7,635 | 2,228 |

*Compiled from The Rubber Manufacturers Association, Inc., statistics.*

## United States Latex Imports

| Year | Pounds | Value |
|---|---|---|
| 1934 | 29,276,134 | $3,633,253 |
| 1935 | 30,358,748 | 3,782,222 |
| 1936 | 44,469,504 | 6,659,899 |
| 1937 | | |
| Jan. | 2,995,027 | 535,546 |
| Feb. | 4,418,474 | 775,202 |
| Mar. | 4,962,915 | 968,053 |
| Apr. | 3,658,660 | 724,757 |
| May | 4,470,572 | 941,235 |
| June | 5,737,563 | 1,253,370 |
| July | 4,302,503 | 924,127 |
| Aug. | 4,033,306 | 838,778 |
| Sept. | 4,258,048 | 839,159 |
| Oct. | 4,384,892 | 844,205 |
| Nov. | 4,671,099 | 875,074 |

*Data from Leather and Rubber Division, United States Department of Commerce, Washington, D. C.*

## United States Statistics

### Imports for Consumption of Crude and Manufactured Rubber

| | October, 1937 | | Ten Months Ended October, 1937 | |
|---|---|---|---|---|
| UNMANUFACTURED—*Free* | Pounds | Value | Pounds | Value |
| Crude rubber......1,000 *lbs.* | 114,624 | $20,250,893 | 1,018,386 | $192,467,312 |
| Liquid latex | 4,384,892 | 844,205 | 43,221,960 | 8,644,432 |
| Jelutong or pontianak | 1,030,101 | 149,516 | 11,626,692 | 1,352,344 |
| Balata | 64,703 | 12,090 | 659,240 | 130,479 |
| Gutta percha | 31,912 | 11,181 | 1,345,028 | 284,455 |
| Guayule | 553,400 | 68,178 | 5,150,900 | 642,074 |
| Siak | 32,335 | 3,148 | 397,221 | 35,716 |
| Scrap and reclaimed | 1,171,485 | 50,053 | 12,138,299 | 389,066 |
| Totals | 7,383,452 | $21,389,264 | 75,557,726 | $203,945,878 |
| Chicle, crude ..........*Free* | 199,157 | $67,947 | 7,902,792 | $2,264,410 |
| MANUFACTURED—*Dutiable* | | | | |
| Rubber tires ........*number* | 8,185 | $8,138 | 63,628 | $107,859 |
| **Rubber boots, shoes, and** overshoes ...........*pairs* | 3,196 | 1,039 | 27,868 | 12,794 |
| Rubber soled footwear with fabric uppers .......*pairs* | 56,180 | 9,097 | 748,898 | 189,636 |
| Golf balls ..........*number* | 41,856 | 3,874 | 527,490 | 60,187 |
| Lawn tennis balls...*number* | 120 | 16 | 304,194 | 26,557 |
| Other rubber balls...*number* | 41,194 | 2,005 | 4,125,399 | 139,450 |
| Other rubber toys, except balls | 30,668 | 5,414 | 665,013 | 96,870 |
| Hard rubber combs..*number* | 53,251 | 3,541 | 690,787 | 44,522 |
| Other manufactures of hard rubber | ...... | 1,673 | ...... | 28,382 |
| Friction or insulating tape.. | 25,620 | 1,490 | 147,600 | 8,359 |
| Belts, hose, packing, and insulating material | ...... | 20,293 | ...... | 220,498 |
| Druggists' sundries of soft rubber | ...... | 7,898 | ...... | 68,585 |
| Inflatable swimming belts, floats, etc. ........*number* | 700 | 66 | 872,403 | 57,916 |
| Other rubber and gutta percha manufactures....*lb.* | 91,458 | 25,869 | 1,336,924 | 300,901 |
| Totals | ...... | $90,413 | ...... | $1,362,516 |

### Exports of Foreign Merchandise

| | | | | |
|---|---|---|---|---|
| RUBBER AND MANUFACTURES | | | | |
| Crude rubber | 1,007,000 | $172,466 | 16,799,190 | $3,228,143 |
| Balata | 29,848 | 8,431 | 574,389 | 165,419 |
| Gutta percha, rubber substitutes, and scrap | 193,089 | 18,370 | 821,321 | 142,636 |
| Rubber manufactures | ...... | 575 | ...... | 19,579 |
| Totals | ...... | $199,842 | ...... | $3,555,777 |

### Exports of Domestic Merchandise

| | | | | |
|---|---|---|---|---|
| RUBBER AND MANUFACTURES | | | | |
| Reclaimed ..............*lb.* | 3,630,033 | $181,665 | 24,631,367 | $1,170,752 |
| Scrap ..................*lb.* | 4,576,368 | 93,524 | 67,039,709 | 1,326,850 |
| Cements ...............*gal.* | 23,379 | 23,971 | 277,160 | 247,521 |
| Rubberized automobile cloth, *sq. yd.* | 39,814 | 19,730 | 498,365 | 224,839 |
| Other rubberized piece goods and hospital sheeting.*sq. yd.* | 152,651 | 65,344 | 1,569,156 | 669,900 |
| Footwear | | | | |
| Boots ..............*pairs* | 15,561 | 34,925 | 84,955 | 191,305 |
| **Shoes** ..............*pairs* | 21,210 | 21,019 | 222,692 | 132,798 |
| Canvas shoes with rubber soles ............*pairs* | 27,528 | 16,824 | 381,510 | 227,106 |
| Soles .............*doz. prs.* | 3,100 | 6,754 | 38,811 | 75,900 |
| Heels ............*doz. prs.* | 29,129 | 17,275 | 469,514 | 278,682 |
| Soling and top lift sheets... | 36,868 | 6,632 | 551,569 | 102,791 |
| Gloves and mittens..*doz. prs.* | 10,241 | 22,376 | 77,255 | 165,476 |
| Water bottles and fountain syringes ..........*number* | 20,802 | 11,057 | 266,319 | 109,080 |
| Other druggists' sundries | ...... | 66,786 | ...... | 506,905 |
| Gum rubber clothing *doz.* | 36,801 | 57,405 | 292,130 | 486,541 |
| Balloons .............*gross* | 53,368 | 48,262 | 382,911 | 299,303 |
| Toys and balls | ...... | 32,017 | ...... | 153,748 |
| Bathing caps ..........*doz.* | 1,657 | 3,062 | 47,509 | 74,344 |
| Bands ..................*lb.* | 25,451 | 12,565 | 240,860 | 101,060 |
| Erasers ................*lb.* | 31,644 | 20,424 | 342,781 | 196,746 |
| Hard rubber goods | | | | |
| Electrical battery boxes | 19,968 | 12,997 | 247,780 | 147,718 |
| Other electrical......*lb.* | 26,755 | 10,267 | 365,376 | 87,286 |
| Combs, finished ....*doz.* | 9,822 | 5,202 | 105,132 | 62,914 |
| Other hard rubber goods.. | ...... | 14,486 | ...... | 200,528 |
| Tires | | | | |
| Truck and bus casings, *number* | 35,843 | 862,154 | 200,903 | 4,180,646 |
| Other automobile casings, *number* | 53,886 | 561,819 | 663,109 | 6,940,756 |
| Tubes, auto ......*number* | 42,557 | 79,580 | 543,077 | 847,799 |
| Other casings and tubes, *number* | 13,400 | 55,381 | 73,995 | 494,857 |
| Solid tires for automobiles and motor trucks.*number* | 406 | 9,290 | 3,610 | 106,379 |
| Other solid tires | 105,284 | 17,970 | 912,404 | 146,207 |
| Tire sundries and repair materials | ...... | 43,802 | ...... | 675,817 |
| Rubber and friction tape..*lb.* | 40,002 | 13,217 | 688,295 | 180,891 |
| Fan belts for automobiles.*lb.* | 52,546 | 29,984 | 635,137 | 357,494 |
| Other rubber and balata belts ..................*lb.* | 316,376 | 177,156 | 2,771,230 | 1,459,636 |
| Garden hose ............*lb.* | 36,572 | 8,665 | 750,425 | 155,135 |
| Other hose and tubing....*lb.* | 404,828 | 157,186 | 4,493,867 | 1,731,909 |
| Packing | 139,195 | 59,323 | 1,541,566 | 671,149 |
| Mats, matting, flooring, and tiling | 72,476 | 11,071 | 950,778 | 145,701 |
| Thread | 25,170 | 19,370 | 582,729 | 310,573 |
| Gutta percha manufactures.. | 26,292 | 8,294 | 946,164 | 270,239 |
| Other rubber manufactures.. | ...... | 146,494 | ...... | 1,141,590 |
| Totals | ...... | $3,065,325 | ...... | $27,056,871 |

## Dominion of Canada Statistics

### Imports of Crude and Manufactured Rubber

| | September, 1937 | | Six Months Ended September, 1937 | |
|---|---|---|---|---|
| | Pounds | Value | Pounds | Value |
| UNMANUFACTURED | | | | |
| Crude rubber, etc. | 5,367,536 | $1,045,926 | 38,612,411 | $7,894,863 |
| Gutta percha | ...... | ...... | 5,914 | 4,062 |
| Rubber, recovered | 1,298,800 | 64,747 | 7,104,700 | 341,018 |
| Rubber, powdered, and gutta percha scrap | 180,600 | 4,499 | 1,956,100 | 42,527 |
| Balata | 540 | 446 | 8,333 | 3,937 |
| Rubber substitute | 38,200 | 9,365 | 209,000 | 45,360 |
| Totals | 6,885,676 | $1,124,983 | 47,896,458 | $8,331,767 |
| PARTLY MANUFACTURED | | | | |
| Hard rubber comb blanks... | ...... | $824 | ...... | $1,723 |
| Hard rubber tubes | ...... | ...... | ...... | ...... |
| Hard rubber, n. o. s. | 4,805 | 3,315 | 33,815 | 23,792 |
| Rubber thread not covered.. | 3,850 | 2,968 | 22,287 | 17,279 |
| Totals | 8,655 | $7,107 | 56,102 | $42,794 |
| MANUFACTURED | | | | |
| Bathing shoes .........*pairs* | 26 | $28 | 31,841 | $7,495 |
| Belting | ...... | 10,133 | ...... | 58,750 |
| Hose | ...... | 11,388 | ...... | 57,459 |
| Packing | ...... | 7,494 | ...... | 41,149 |
| Boots and shoes........*pairs* | 15,683 | 16,234 | 30,430 | 23,011 |
| Canvas shoes with rubber soles ...............*pairs* | 1,306 | 600 | 119,891 | 33,520 |
| Clothing, including waterproofed | ...... | 3,361 | ...... | 23,438 |
| Raincoats ...........*number* | 788 | 4,112 | 4,617 | 18,479 |
| Gloves ..........*dozen pairs* | 431 | 1,149 | 2,061 | 5,527 |
| Hot water bottles | ...... | 4,140 | ...... | 18,314 |
| Liquid rubber compound.... | ...... | 3,612 | ...... | 23,611 |
| Tires, bicycle .......*number* | 6,521 | 2,205 | 70,434 | 28,948 |
| Pneumatic ........*number* | 2,707 | 32,897 | 14,794 | 165,709 |
| Inner tubes .......*number* | 574 | 1,381 | 3,754 | 7,598 |
| Solid for automobiles and motor trucks....*number* | 69 | 1,942 | 369 | 15,020 |
| Other solid tires | ...... | 1,264 | ...... | 11,764 |
| Mats and matting | ...... | 2,731 | ...... | 23,305 |
| Cement | ...... | 4,929 | ...... | 26,641 |
| Golf balls ...........*dozens* | 1,669 | 3,771 | 30,371 | 68,269 |
| Heels ................*pairs* | 4,870 | 305 | 138,618 | 4,187 |
| Other rubber manufactures.. | ...... | 128,645 | ...... | 784,079 |
| Totals | ...... | $242,321 | ...... | $1,446,273 |
| Totals, rubber imports.. | ...... | $1,374,411 | ...... | $9,820,834 |

### Exports of Domestic and Foreign Rubber Goods

| | Produce of Canada Value | Reexports of Foreign Goods Value | Produce of Canada Value | Reexports of Foreign Goods Value |
|---|---|---|---|---|
| UNMANUFACTURED | | | | |
| Waste rubber | $10,139 | ...... | $101,149 | ...... |
| MANUFACTURED | | | | |
| Belting | $84,441 | ...... | $454,013 | ...... |
| Canvas shoes with rubber soles | 45,118 | ...... | 576,192 | ...... |
| Boots and shoes | 592,778 | ...... | 2,536,634 | ...... |
| Clothing, including waterproofed | 28,979 | ...... | 189,766 | ...... |
| Heels | 18,800 | ...... | 98,339 | ...... |
| Hose | 13,502 | ...... | 121,014 | ...... |
| Soles | 16,471 | ...... | 115,008 | ...... |
| Tires, pneumatic | 654,584 | ...... | 4,609,117 | ...... |
| Not otherwise provided for | ...... | ...... | 39 | ...... |
| Inner tubes | 60,911 | ...... | 385,534 | ...... |
| Other rubber manufactures.. | 55,663 | $1,441 | 422,139 | $39,501 |
| Totals | $1,571,247 | $1,441 | $9,507,795 | $39,501 |
| Totals, rubber exports.. | $1,581,386 | $1,441 | $9,608,944 | $39,501 |

## Imports by Customs Districts

| | November, 1937 *Crude Rubber | | November, 1936 *Crude Rubber | |
|---|---|---|---|---|
| | Pounds | Value | Pounds | Value |
| Massachusetts | 8,658,034 | $1,573,381 | 9,823,286 | $1,505,059 |
| St. Lawrence | 57 | 9 | ...... | ...... |
| New York | 88,224,832 | 15,266,502 | 70,557,341 | 10,967,213 |
| Philadelphia | 1,926,773 | 328,478 | 1,824,183 | 275,753 |
| Maryland | 5,330,099 | 899,551 | 1,804,186 | 281,021 |
| Georgia | ...... | ...... | 178,535 | 27,229 |
| Mobile | ...... | ...... | 1,114,744 | 187,050 |
| New Orleans | 2,667,922 | 449,619 | 487,083 | 78,340 |
| Los Angeles | 14,313,049 | 2,237,267 | 226,000 | 35,605 |
| San Francisco | 303,886 | 53,014 | ...... | ...... |
| Oregon | 13,440 | 2,386 | ...... | ...... |
| Michigan | 67,200 | 12,220 | ...... | ...... |
| Ohio | 113,808 | 27,622 | 231,313 | 28,862 |
| Colorado | ...... | ...... | 156,800 | 25,281 |
| Totals | 121,619,100 | $20,850,049 | 86,403,471 | $13,411,413 |

*Crude rubber including latex dry rubber content